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A LETTER

TO

SIR HENRY STEUART, Bart.

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A LETTER

TO

SIR HENRY STEUART, BART.

ON

THE IMPROVEMENT

IN THE

QUALITY OF TIMBER,

TO BE EFFECTED BY THE

HIGH CULTIVATION AND QUICK GROWTH

OF

FOREST-TREES,

IN REPLY TO CERTAIN PASSAGES IN HIS "PLANTER'S GUIDE."

384.38

BY W. WITHERS.

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A LETTER

TO

SIR HENRY STEUART, BART.

SIR,

THE second edition of your Planter's Guide (a copy of which you have had the politeness to send me) contains some observations on my Letter to Sir Walter Scott, to which I feel it incumbent upon me to reply. Your animadversions upon what you are pleased to term my "indecorous" attack upon that worthy baronet, whom you designate "the greatest writer of the age," I shall for the present pass by, and proceed at once to your objection to the system of planting forest-trees, recommended in my pamphlets.

This objection is important; and, if well founded, would materially diminish the advantages anticipated from the style of planting which I have earnestly endeavoured to bring into use, in preference to the slovenly, but as you say erroneously-termed, Scotch method, which many of your observations tend to uphold. Your objection amounts in substance to this, that though my system of planting may properly be adopted where ornament or PROFIT is the object, it cannot be safely introduced into the ROYAL FORESTS, because it would occasion the trees to grow so fast, that it would *injure the quality of the timber and render it unfit for naval purposes:* in other words, that to prepare poor land for oak trees, by trenching or ploughing, and by spreading thereon twenty cart-loads of marl and a like quantity of muck per acre, would produce so *injurious* an effect upon the quality of the trees when they have arrived at maturity (a century or two afterwards), that it would be unsafe to use them in the construction of ships of war.

This is the position you have taken; and a most extraordinary one it is, when we consider, that it is in support of a writer who gravely contends, that the *best* preparation of the soil will have no effect upon the growth of trees after the first ten or twelve years. The " greatest writer of the age" recommends cheap planting upon unprepared ground, because the effect of preparation will disappear in a few years; and you, who I would readily concede to be the " greatest phytologist of the age," deprecate all preparation whatever, because its effects will be fatally experienced after the lapse of a hundred years. If such be the " results of phytological science," if men of great talents and deep learning are obliged to support the same opinion by the use of such opposing and contradictory reasoning, does it not follow that that opinion is indefensible on any ground? But if it be defensible, surely some indulgence may be granted to those who, having little pretension to either science or learning, are content to establish an useful truth by successful experiment, without using abstruse reasoning to ascertain, whether the effect produced be in strict accordance with the generally received principles of *science* or not. As an humble experimentalist, as an observer of effects who pretends not to a *scientific* knowledge of causes, I therefore claim this indulgence, while I examine with deference the validity of your objection to the introduction, into the PUBLIC FORESTS, of a system of planting which I have shown to be so successful in other places.

From the earnestness with which you oppose the adoption of trenching and manuring in these forests, it may be inferred, that you consider the dock-yards to be wholly or almost entirely supplied with timber from thence. If otherwise, your objection to the introduction of that mode of culture therein, will not be sufficient to secure the country from the evil you anticipate. If timber for the navy be to any extent obtained from the estates of private gentlemen, the public can have little or no security that fast-growing trees will not be sold for that purpose. To ensure, therefore, the *perfect safety* of the British navy, you should not only prevent the introduction of this new system into the forests, but you should prevail upon the legislature to prohibit the trenching and manuring of *any* land for oak trees, and also the planting of any good land under severe penalties. Nothing short of this, if your opinion be correct, can prevent the occurrence of those formidable evils, of which you express yourself to be so much in dread, and the effects of which, as you state, may not become apparent until they are past a cure.

This therefore is worthy of your most serious consideration, because many land-owners have already become converts to this new method of raising forest-trees; and I have no doubt that *your* recommendation of it, as the best means of obtaining " a *speedy return of crop and marketable timber*," will add considerably to the number. When gentlemen are convinced, that the trenching and manuring system will produce this beneficial effect; when they are thoroughly satisfied, that it will prevent the loss and disappointment which the hole-digging system produces; and when they know, if profit be not their object, that it will more certainly as well as quickly add beauty to their estates;—they will not fail to adopt it, totally regardless of its ruinous consequences to "future navies." To be consistent, therefore, you ought, as a true patriot, to make an immediate and powerful appeal to the legislature, to protect us against the further extension of a system, which is pregnant with consequences so alarming. I am, however, not without hope that I shall be able to convince you, that your alarm is groundless; and that this frightful system may not only be adopted for general planting, but be also introduced into the royal forests without risking our national independence, or doing injury to the quality of British oak, which, as you justly observe, "it has been the pride of the "country to raise in such unrivalled perfec-"tion."

I must confess, that I received the first intimation of your differing with me on this subject with some surprise, and that I felt no little anxiety to learn the nature of your objections. In your letter of the thirtieth of November last, which politely announced that you had directed a copy of your work to be forwarded to me, you remark, " That " on comparing the practice of trenching and " manuring with the laws of nature, and the " results of science and experience, you were " obliged to say, that there were some *errors* " into which I had fallen; and particularly " by applying *universally* to the soil those " agents, that cannot properly be so applied " unless under *peculiar circumstances*." This remark, I repeat, gave me a great desire to read your work; and you may recollect that I stated as much in acknowledging the receipt of your letter. I said, " I am most anxious to " learn the reasons which can be urged " against trenching land for planting in *any* " case, or against the application of manure " to *poor sterile* soils in all cases where it can " be obtained," (and I have never recommended its *universal* application). " Such reasons," I continued, " must be very powerful indeed, to convince me against the evidence of so many facts before my eyes; " and that they must almost go the length of " proving, that although certain causes are " known to produce certain effects, they " *ought not*, according to the laws of nature

“ and the results of science, to do so.” Such were my opinions on perusing your letter, before I had received the second edition of your work.

I wearied myself with conjectures respecting the nature of the objections which could be urged by so eminent a planter as yourself, against a system which I thought was founded upon a rock. At one time I imagined you would support the opinion of your friend, Sir Walter Scott, and produce proofs, that after a short period, there would be no difference between trees planted upon prepared and upon unprepared soil; and at other times, that you had adopted the notion of a worthy planting-neighbour of mine, that although the trees would certainly make much greater progress in the former than in the latter case, the compound interest upon the increased expense would more than counterbalance the advantage to be derived from quick growth: but when I looked around me at *home*, and took another survey at Letheringsett and at Holkham, and made a comparison with other places not again to be named; I felt that I was invulnerable upon both those points. To these objections I had a ready answer; but I could not comprehend, how trenching and manuring *poor* land for forest-trees, and subsequent culture, could be contrary to the laws of nature and the results of science. If it were so, it appeared to me to follow, that to put trees into an unbroken barren soil, and to suffer them to be afterwards choked with weeds, was to plant conformably to the laws of nature, and the principles of science; but if any one should have the hardihood to maintain, that that mode ought to be generally adopted, he might justly be ranked among the professors in Swift's academy at Lagado.*

Thus anxious and perplexed, and feeling some little apprehension at having my favorite theory opposed by so eminent an author, I received your work with its notes and illustrations; and when I found that you condemned my system, not on account of its expense, nor because it would fail after a certain period to produce the growth of wood which I anticipated, but because it would *accelerate* growth, and thereby *increase the planter's profit;* when I discovered that your objection was solely to that increase of growth which I conceived so desirable, and was limited moreover to its introduction into the public forests only ;—then my confidence returned. I felt, that all men of common understanding and common observation, as well as those who possessed practical knowledge, would at once reject the specious reasoning, or more properly the mystification, by which you endeavour to support or rather to envelop your objection; and the total *indifference* with which this new doctrine of yours has been received by the public, appears thus far to have confirmed my anticipations. This is quite natural, for who, with a mind not thoroughly imbued with preconceived theoretical notions, could ever imagine, that a fine progressively fast-growing tree could be inferior in quality to the slow grown dwarf, or that health and vigour should be more liable to decay, and possess less strength, than stinted deformity.

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* See Gulliver's Travels.

To use the words of a correspondent in a high *official* situation, a gentleman no less eminent for his scientific knowledge than for his practical skill and experience in the conversion of timber for naval purposes, I should "as soon believe that the animal that "was well attended to in its infancy, and "thereby increased in growth and I should "say in strength, would have its life shortened "and its strength reduced thereby, as that "the preparing of the soil for planting, "and keeping it clean from weeds, would "facilitate the decay of timber, and reduce "its strength when applied to the purposes for "which it was reared."

That this your position is wholly untenable; that it is contrary to those laws of nature to which you continually appeal, and to those principles of science with which you are so conversant; and that it is also opposed to your own recorded opinions and to the "results of experience," I shall be able most satisfactorily to establish: but I must first make a few remarks upon some of your other statements and opinions, which appear to me to require notice.

You commence your observations on my two pamphlets by stating, that their object is to show, that, by trenching the ground previously to planting, and by keeping it clean for some years afterwards, greater progress will be made by wood of every sort; and that a greater return will be made to the planter thereby, in ten or twelve years, than in twenty-five or thirty years by the common method; and that the system is not new, having been well known in England for more than two centuries. You then state, that the practice of trenching and manuring land for plantations (referring for proof thereof to the seventh section of your work) had considerably attracted your attention about forty years ago; that you had since made many comparative and pretty extensive trials of the *deepening* and the common method, which led to the same results as those stated by me; and that, had I not brought forth my first pamphlet when I did, you probably should, ere now, have drawn up a similar tract yourself, for the purpose of illustrating to a certain extent a similar practice.

You here misrepresent the object of my pamphlets, by confining it to trenching and subsequent culture, the declared object of the first of them being principally to show the effect of *manuring* land for forest-trees; and by blending together your remarks upon both those subjects you would make it appear, that, because trenching has been well known in England for more than two centuries, what I have written in favour of *manure* contains nothing new. Fearing, however, that the antiquity of manuring land for plantations might not obtain credit, you put in your own claim to originality by stating, that the practice both of trenching and *manuring* land had considerably attracted your attention about forty years ago; for proof of which you refer to the seventh section of your work, which contains *no evidence whatever in support of your statement*. It seems, too, that you have since made many comparative and pretty extensive trials of the *deepening* and the common method, but not a single experiment does it appear that you ever tried to show the effect of *manure*. The truth is, that with regard to *trenching*, so far from pretending that I had made any discovery, I expressly stated the contrary in my first pamphlet ; but with respect to the application of manure for forest-trees, I am the first person who ever publicly recommended such a practice, or ever adopted it beyond the mere shrubbery or pleasure-ground. The general adoption of this method of planting *poor* lands would, I feel confident, be attended with great individual and national advantages, and I claim the credit of being its author.

The next misrepresentation of which I have to complain relates to the kind of manure to be used. Your words are, "The "most material point on which he has gone "wrong is, the application of *fresh-made* dung "or muck to the roots of woody plants." I think you will not easily find any passage in either of my pamphlets, which can justify this statement. On the contrary, in describing my method of planting I expressly mentioned

(*Memoir, p.* 17), that "I carried on and spread twenty loads per acre of good *rotten* muck." What, therefore, can have led you into the error of stating that I applied "*fresh-made* "*dung*," I cannot imagine.

With your following remarks I cannot wholly agree, though they contain a very flattering compliment to myself. You say, "For all plantations in parks and pleasure- "grounds, and even in many that are intended *solely for* PROFIT, I highly approve of "previous trenching and manuring, and "keeping the ground clean with the hoe, but "by no means digging it with the spade, for "a few years; that is, in situations where the "nature of the ground will admit, and where "sufficient manure for a green crop can be "procured. Having for many years successfully followed this method myself, I can "with the greater confidence recommend it to "others. But, from the *very nature of the* "*thing*, it is evident that it cannot be adopted for GENERAL PLANTING, or ever come "into universal use. All men, however, will "admit, that Mr. Withers is intitled to great

" praise, for so earnestly pressing it on the
" public attention."

I cannot perceive any thing in the " *nature*" of trenching and manuring which must preclude its adoption for general planting, or prevent it ever coming into universal use. I am aware, that it is difficult in many places to obtain common dung or muck for extensive plantations, but substitutes may be procured in most situations. Indeed your own work shows, that, for this purpose, a compost of peat-moss and lime is a most " noble and valuable compound, adapted to all soils and " climates, and which may be applied at a " very small expense.*

" There are," you say, " comparatively " few situations in this kingdom in which " peat-moss of tolerable quality is unattainable, on account of distance; and it is fortunate that it is so, because we know no given " substance that could supply its place. In " many districts it costs, when made up with

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* Planter's Guide, p. 464.

" lime, not more than six pence per cart load, " and there are many in which it may be had " at a still smaller cost." Thus, then, you have yourself removed the only real objections to the use of manure for general planting; and as to trenching, we know that it is practicable in all situations where it is possible to dig a hole for a tree: and I hope you will agree with me, that it is much better so to employ what is called " surplus population," than to force men to break stones upon the roads, or to dig holes one day and fill them up the next, or, what is still worse, to send out of the country those active, able-bodied, and industrious, but half-starved labourers, who were formerly and ought now to be regarded as the great source of our national strength.

You appear to think, indeed you state, that my Letter to Sir Walter Scott was written chiefly with the view of " improving the " management of the royal forests, and raising " superior timber for the navy;" and you say, " that if I could have accomplished my object, " it was sufficient to have placed me at the " head of the arboriculturists of the present "day." Here you again misrepresent me. My sole object in writing the second pamphlet was, to expose the "fundamental errors" of your friend, Sir Walter Scott, in that essay which you describe as "one of the most powerful, judicious, and useful tracts existing "in the language." The heresy there broached, that the preparation of land for planting would cease to have any effect beyond a few years, after the *proofs* which I had given to the contrary, excited rather strong feelings in my mind; and I sat down to answer him under an impression that he had written against his own conviction, thinking it impossible, that the "greatest writer of the age," who had besides paid considerable attention to the subject, could really believe, that trenching and manuring would produce such a trifling and temporary effect. I wrote with warmth I acknowledge; but I more than once apologized in my Letter if I had been guilty of misrepresentation. That apology I have reason to believe was quite satisfactory to the worthy baronet; and I therefore do not conceive, that I am accountable to others for any apparent want of courtesy in my address.

To return to the royal forests. I assure you, that I had not originally any intention to touch upon them; but just as I was about to begin my Letter to Sir Walter, accident put Mr. Billington's work in my way, the statements in which you will allow were too valuable for my purpose to be passed over unobserved: and however you may approve of "the steady, "judicious course of management," which you say the commissioners have been for *some time* pursuing, you cannot pretend to justify the gross ignorance and mismanagement displayed in Dean Forest by the surveyor of eleven thousand acres, nor contend that the public has no right to complain that their money was so profligately wasted. You may smile at my "pathetic lamentations," and "the shame and indignation I virtuously felt "on that account;" you may accuse me of a desire "to catch the gale of popularity by "making an attack upon the government:" but you will find few of your readers disposed to join you in thinking, that the exposure of the wasteful and ignorant expenditure of the public money is a fit subject for ridicule or sarcasm; or that those who earnestly and honestly endeavour to prevent its recurrence are justly liable to censure, or ought to be charged with being actuated by improper motives.

You would fain persuade your readers, that it is almost impossible for the "greatest "writer of the age" to advance an incorrect opinion; and in your anxiety to defend him, you palpably contradict yourself. You repeatedly acknowledge your partiality for the trenching and manuring system, you advocate its advantages and urge its adoption, you write an entire section in its favour *without restriction or qualification*, you make it in fact the "foundation and corner-stone" of your edifice; and yet, when the "greatest writer" puts forth an opinion, that both trenching and manure are *unnecessary* and *useless* (though that opinion tends to cut up the system by the roots, and to destroy your argument in favour of phytological science), you affect to regard it at most as an error of a trifling and unimportant nature. It is quite impossible that you should both be right. Trenching and manure are either necessary for profitable planting, or they are not. If they be necessary, Sir Walter Scott has been guilty, not of a "trivial," but of a most flagrant and enormous error, the general adoption of which would necessarily be productive of great loss and disappointment to thousands. If they be not necessary, you have endeavoured to mislead the public by recommending a useless and expensive process, which can ultimately produce no profitable result. Let it be observed too, that your objection as to the *quality of the timber* will not apply here. Sir Walter Scott did not write for the information of the commissioners of woods and forests, but for the guidance of those who sought "a speedy "return of crop and marketable timber." Admitting, therefore, the validity of your objection to the introduction of the trenching and manuring system into the forests, Sir Walter's opinions are still fundamentally and essentially wrong, according to your own showing, as applied to planting for profitable purposes.

From this dilemma let those profound philosophers and great rural economists, the

Edinburgh Reviewers, extricate you if they can.

That I may not be suspected of misrepresenting your opinions as to the importance both of trenching and manure for general planting, I will here give a copious extract from the sixth section of your work.

" TREES," you say,* " far more than agri-
" cultural crops, require *depth* of soil to raise
" them to *perfection:* the effect of climate
" appears much less necessary, in giving them
" their greatest magnitude. Accordingly,
" notwithstanding the insularity of our situa-
" tion, which naturally tends to the equali-
" zation of climates, little park-timber is
" found in Scotland, or the north of England,
" approaching in *size* and *grandeur* to the
" great trees in the midland and southern
" counties, owing probably to the *superior*
" *soil,* which exists in the latter districts. Of
" these the Swilcar, Shelton, Chandos, and
" Fredville oaks; the Tortworth, Burleigh,

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* Planter's Guide, p. 175 and following.

" and Cobham chestnuts; the Chipstead
" and Tutbury elms, the Woburn ash, the
" Knowle beech, and the Cobham lime and
" sycamore, are eminent examples, as may be
" seen in Mr. Sturt's late elegant delineations.
" A more powerful delineator than Sturt*
" says, of the King's oak at Blenheim,
" that, ' although scathed and gnarled in its
" ' branches, the immense trunk still showed,
" ' to what a gigantic size the monarch of
" ' the forest can attain, in the groves of
" ' merry England.' As it appears plain, from
" these and other instances, both in the north
" and south, that the size of wood will be
" mainly in proportion to *the depth* of the soil
" on which it grows, it should be the *chief*
" *study* of the planter to *promote* that *capital*
" *object*. It is a sound maxim as old as Theo-
" phrastus, and repeated by Columella and
" Pliny as familiar to the Roman husbandman,
" to transfer no tree to a worse soil than that
" in which it had previously stood: and
" whatever in this respect holds true of *young*
" plants, must *à fortiori*, hold more decidedly

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* The greatest writer again.

" true of large subjects, such as are intended " for removal. If in transplanting we must " often increase the cold, and other circum- " stances adverse to trees, it becomes us the " more diligently to study, that the soil be " rendered as RICH and DEEP as POSSIBLE, " in order in some sort to counterbalance those " disadvantages.

" There are few persons so HAPPILY situa- " ted as to be able to command much *animal or* " *vegetable* MANURE, *for the use of trees.* " Such artificial modes of *enrichment* or im- " provement must therefore be resorted to, as " science or experience has pointed out. By " following such guides, we may often learn so " to *alter* the *constituent parts* of soils, as to " *encrease their fertility*, by the *addition of* " *ingredients* in which they are *deficient*, and " in some cases by the subtraction of such " as too copiously abound in them; or else, by " effecting chemical changes of some constitu- " ent part by incineration, or by the applica- " tion of mineral *manures*. Soils, considered as " agents of vegetable culture, are subjected to " operations, which effect changes on them

" either *mechanically* or chemically. Of the " former description there are none so *important* for the use of trees as *deepening* and " *pulverizing*. Deepening can be executed " with effect only by trenching or double " digging (for the plough can do little in such " a business), and pulverizing is naturally " combined with that process. The depth of " pulverization, as Sir H. Davy well observes, " must depend on the nature of the soil " and subsoil. In *rich* clayey soils it can " scarcely be too deep; and even in sands, " unless the subsoil contains some principle " noxious to vegetables, deep comminution " should be practised. When the roots are " deep, they are less liable to be injured " by excessive rain, or excessive *drought*, and " the radicles are shot forth into *every part* of " the soil. In a word, nothing but water " stagnating under the trench, in consequence of a clayey bottom, and the risk of " the roots being thereby chilled, should prevent *trenching* from being ALWAYS executed " as *deep* as possible.

" The surprising changes worked on all

" soils in consequence of a minute comminu-
" tion of their parts, and the various ways in
" which it increases fertility, have only of late
" years been communicated to agriculture by
" chemical analysis and investigation :* so that
" there is the less wonder that they should, in
" a great measure, have escaped the planter's
" notice. If the process be *important* in *gen-*
" *eral* to woody plants, it must be greatly more
" important to subjects meant for removal;
" and I earnestly request the reader's attention
" while I take a rapid view of it.

" *Pulverization*, or the mechanical division
" of parts, is applicable to *all* soils in proportion
" to their adhesive texture; as even the most
" silicious, if not duly stirred, will become
" too compact and dense for the admission of
" air, rain, and heat, and by consequence for
" the free growth of plants. Strong upland clays,
" not submitted to the plough or the spade,
" will in a few years be found in the possession
" of fibrous-rooted perennial grasses, which

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* Tull communicated them practically at least a century back.

" form a clothing on their surface, or of strong " tap-rooted trees, such as the oak, which force " their way through the interior of the mass. " For these reasons, the *first and great object* " should be, to give *scope to the young roots and* " *fibres; because without fibres in abundance, no* " *woody plant can shoot freely, and develope its* " *parts, whatever be the richness of the soil.* " The fibrous roots, as has been shown in section 4, absorb the juices by means of introsusception; but the quantity absorbed does " not depend alone on the quantity existing " in the soil, but on *the number of the absorbing fibres. The more we can comminuate the* " *soil, the more those fibres will be encreased, the* " *more this nourishment will be absorbed, and* " *the more vigorous and healthy the plant will* " *become.*

" Further: Comminution of parts encreases " capillary attraction, or the sponge-like property of soils, by which their humidity is " rendered more uniform and more effective. " It is evident, that where the particles of " earth are the most minutely divided, capillary attraction must be the greatest; for

" gravels and sands hardly retain water, while " clays, not opened by pulverization, either " do not absorb water at all, or, when by long " action it is absorbed in a superabundant " quantity, it is not readily discharged. Wa- " ter is necessary to the growth of plants: it is " essential to the juices or extract of the vege- " table matter which they contain; and unless " the soil, by means of comminution, be fitted " to retain the quantity of water requisite to " produce those juices, the addition of manure " will be useless. *Manure* is *ineffectual tow-* " *ards vegetation* until it becomes *soluble* in *wa-* " *ter;* and it would remain useless in a state " of solution, if it so abounded as utterly to " exclude air: for, in that case, the fibres or " mouths of plants would be unable to per- " form their functions, and they would soon " drop off by decay.

" The *temperature of soils,* which few " planters take into their consideration, is " *singularly improved* by their being *pulverized.* " Earths, as Griesenthwaite remarks, are " among the worst conductors of heat which " we know; consequently, it would require a

" considerable time, ere the gradually in-
" creasing temperature of spring could com-
" municate its genial warmth to the roots of
" plants, if their lower parts were not heated
" by other means. To remove this *defect*,
" which always belongs to a close or dense
" soil, it is essentially necessary to have the
" *land open*, so that there may be free ingress
" to the genial air and tepid rains of spring.

" Water, moreover, is known to be a con-
" denser and solvent of carbonic acid gas,
" which, when the ground is open, can be
" carried immediately to the roots of vegeta-
" bles, and probably contributes to their
" growth. But if the land be close, and the
" water lie on or near the surface, then the
" carbonic acid gas, which always exists in
" the atmosphere and is carried down by the
" rains, will soon be dissipated. Let it be
" observed also, that an open soil, besides be-
" ing favourable to the transmission of nutri-
" ment to the roots of plants, is likewise fa-
" vourable to their extension, and thereby
" enlarges the field whence nutriment is deri-
" ved. Nor are these the only benefits result-

" ing from a friable soil: for, in addition to " its being the best adapted to supply vegeta- " bles with food, it is always most suitable for " effecting those changes in the *manure* itself, " which are equally necessary to the prepara- " tion of such food; and animal and vegetable " substances, exposed to the alternate action of " heat, moisture, light, and air, undergo " spontaneous decompositions, which indepen- " dently of it would not take place.

" Soils are surprisingly benefitted by aera- " tion, and the free admission of the weather " into their interior parts. This is generally " considered as the principal use of fallowing; " and its importance in gardening is proved by " compost-heaps, and both winter and sum- " mer ridging up. The precise advantages " however of exposure to the air, independ- " ently of the concurrent influence of water, " heat, and the other effects above-mentioned " as resulting from pulverization, do not seem " at present to be fully ascertained. It is ad- " mitted on all hands, that carbonic acid gas " is absorbed by calcareous earths; and Dr. " Thomson, who is among the ablest of our

“ chemical writers, is of opinion, that the earths “ alone may thus, in all likelihood, administer “ food to plants. Sir H. Davy seems to consider mere exposure to the atmosphere as of “ no benefit whatever to soils : he, therefore, “ condemns fallowing as useless and unprofitable. But the reasons given for such an “ opinion are merely *speculative*, and founded “ on nothing *experimental* or conclusive ; accordingly, they will *convince no skilful agriculturist, nor any practical planter*.*

“ To these facts and observations we may “ add a suggestion of Darwin's respecting “ temperature, which although fanciful, is ingenious; namely, that a certain portion of “ of atmospheric air being always taken down “ into the soil at the time of pulverization, its “ internal heat is thereby promoted and its

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* From this passage it might be supposed, that Sir Henry prefers practical to mere scientific conclusions; and yet, with the same inconsistency which pervades his remarks on trenching and manuring, he treats my opinions with something like contempt, because, neglecting the aid of science, I had formed them entirely on practice, confirmed by experience.

" fertility encreased. The confinement of the " air occasions decomposition, by means of " the moisture in the earthy portions. Ammonia is formed by the union of the hydrogen of the water, with the nitrogen of the " atmosphere, and nitre by the union of oxygen and nitrogen. The oxygen, likewise, " probably unites with the carbon contained " in the soil, and forms carbonic acid gas and " carburetted hydrogen. Hence the heat " given out during these processes.

" Such is a short and very imperfect view " of the manifold beneficial changes, which " deepening and pulverizing effect in soils, according to the ingenious researches of Davy, " Thomson, Griesenthwaite, and others, who " have usefully laboured to render chemical " researches subservient to rural purposes. " Had Tull, who flourished about a century " ago, been acquainted with chemistry, as at " present improved, he would not have missed " that permanent fame, to which his ingenuity " so well entitled him. Tull was unquestionably the first practical advocate for the power " of pulverization; but he was deceived by its “astonishing and various effects, without being able to perceive its limits. Hence he was led into the erroneous belief, that pulverization could even supply the place of manures in farm-management. Modern science, however, would have enabled him to discover, that although the comminuating of soils incredibly multiplies the fibrous roots, or mouths of plants; although it also facilitates the speedy and perfect preparation of their food, and conducts the food so prepared more regularly to the roots, yet of *food itself* it does not communicate the *smallest supply or portion, beyond what the soil actually possesses.* As we cannot, in these times, fall into the error of Tull, let us not omit, for our present purpose, to put a due value on pulverization (which in husbandry of late, as connected with deepening, seems to be rather undervalued), while we endeavour, by the *methods already pointed out*, to add as much as possible to the VIGOUR *and* FOOD of *woody plants.*

“Soils, then, may be most *effectually improved* by the planter, by altering their con-

" stituent parts, as has been above shown, either by the *addition of ingredients*, in which " they are deficient, or by the subtraction of " others that too much abound in them ; but, " in ordinary cases, chiefly in the former way, " by *admixture with other soils*, and by the " application of *mineral manures.* The best " natural soils are certainly those, of which " the materials have been derived from different strata, that have been minutely divided " by air and water, and are intimately blended together. On this account, in *improving* soils by artificial methods, the husbandman or the arboriculturist cannot steer " in so safe a course, as by studying the effects " of intermixture, and imitating the chemistry of nature."

In what you have here urged I entirely concur. It is in fact the theory of my own practice; and although I might not, as you say, understand that theory, it may perhaps be considered, that, without the aid of phytological or chemical science, I have given some reasons in favour of trenching and manuring, which are likely to produce as much practical benefit as your more eloquent and learned essay; and that planters will probably be more convinced by the *facts* which I have stated, than by the classical and scientific authorities you have quoted: and I submit, that it would have been but candid in you to have referred to those facts, as an illustration of your theory.

But who could have believed, that the writer of these admirable and conclusive arguments in favour of trenching and manure, showing that the size, and grandeur, and *perfection* of trees will be in proportion to the *depth* and *richness* of the soil; proving that trenching " is applicable to *all* soils," that it improves their temperature, admits the genial warmth of spring to the roots of plants, is favourable to the transmission of nutriment to their roots, and likewise favourable to their extension, thereby enlarging the field whence nutriment is derived; and pointing out to the planter, who is not so " *happily situated* as to " command animal or vegetable manure for " his trees," by what artificial mode of enrichment or improvement he may so alter the constituent parts of his soils, as to increase their fertility: who could imagine, that a writer like this, who also contends that these are "the true principles of GENERAL PLANTING, "and must equally govern *every* attempt at "successful arboriculture;"* and that, by following this system, we shall "insure to our "trees uniform health and progressive vigour, "and by *consequence* SOUND and VALUABLE "WOOD?"—Who, I repeat, could have thought it *possible*, that the author of such powerful and irrefutable arguments, such sound and convincing opinions in support of the trenching and manuring system, as the means of insuring healthy and vigorous trees, and by consequence sound and valuable wood, should, in the same work which contains these arguments and opinions, endeavour to prove, that this system cannot be safely adopted, because it will injure the quality of the timber?

Your friend, Sir Walter Scott, truly observes,† that it is difficult for the moralist to analyze the mixed motives, which unite to form the impulse of our actions; and I think it will be impossssble to divine a motive, which could induce you to commit so suicidal an act, as that by which you thus endeavour to falsify and destroy your own theory.

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* Planter's Guide, p. 101.

† Waverley, vol. 1., chap. 2.

This, I submit, is a sufficient answer to your objection, and I might here conclude my argument; but, for the sake of the public, who might be misled by your opinions, I will add a few remarks upon other parts of your essay, with some proofs, which will clearly establish the invalidity of that objection.

You state in your letter to me, that my system of planting had attracted the attention of his Majesty's government, and that you had been called upon for an opinion on the expediency of introducing it into the royal forests. The Edinburgh Reviewers say, that you were applied to to *write an answer* to me: but I cannot bring myself to believe that the government, anxious as it must be for the welfare of the British navy, would require more than your opinion on the subject; and I would rather give them credit for a laudable desire to correct that system of mismanagement, which is so amply detailed in the published account of one of their own surveyors, and upon which I took the liberty to animadvert in my letter to Sir Walter Scott. I know that the late Lord Glenbervie, during the time that he held the office of Chief Commissioner of Woods and Forests, was indefatigable in his exertions to obtain information as to the best means of planting and manageing the forests; that he addressed a number of questions to noblemen and gentlemen residing in different parts of the kingdom, who were supposed to be best qualified to give an opinion on the subject, and that the answers he received were calculated to mislead him. One gentleman stated, that "the *expense* of "*trenching* would exceed the *profit*." Another, that "the *only advantage* would be to "promote the growth for the *first two or three* "*years*, but after that period they will grow "as well if the ground had not been trenched, "which upon the whole seems *unnecessary*." And a third actually went the length of saying, that "*so far from trenching* and subsequent "cultivation being of use, I have always seen "it attended with material injury to plantations. When gentlemen wish to raise small "belts or ornamental clumps on their grounds, "this practice of trenching, and afterwards "keeping the *ground* either under some green "crop or hoed, has been of late very much "practised, and it undoubtedly answers the "intention of quickly raising up these plantations; but wherever I have had an opportunity of seeing this practised, I have always "observed that, *whenever this cultivation is "stopped, the progress of the timber stops also.* "In a few years they become sickly, *and "never will be timber.*" Who, after this, can feel surprised, that an erroneous system of planting should have been introduced or continued in the forests? These three gentlemen were all Scotchmen, men of rank and great landed proprietors; and it is natural that Lord Glenbervie, a Scotchman also, should be influenced by their opinions. Both you and the Edinburgh Reviewers are very anxious to disclaim the pitting-method, as belonging peculiarly to Scotland; but, at all events, the

Scotch generally practice and recommend it: and we see that, in the case of Dean Forest, it is more than probable that the opinion of Scotchmen caused it to be adopted there; and thus, according to Mr. Billington's account, to render it necessary to plant THREE MILLIONS of trees to *fill up vacancies* occasioned by mice, long grass, and herbage, *four years* after the *last* of the inclosures had been *completed* according to the contract. All this labour might have been avoided, a great expense saved to the country, and a vast addition made to the present value of the crop, if the trenching and culture system had been adopted. The intentions of Lord Glenbervie and the other commissioners were doubtless good, but they were misled by those who had the reputation of great practical if not scientific knowledge. The present chief commissioner is, I understand, equally anxious to improve the state of the forests; and I will not therefore believe, that you can have been applied to to write down a system, which has a tendency to promote that object. Your opinion might have been solicited, and doubtless was; and a fine opportunity then presented itself for you to give effectual encouragement to that system of planting, to which you say you are so partial, and for the more extensive use of which you so anxiously wish. You might, with perfect propriety as well as consistency, have recommended it as being the most certain and effectual method of promoting the growth of wood; and if you really felt any doubt of its effect upon the *quality* of the timber, you might modestly have referred the government to the gentlemen connected with the dock-yards, and the contractors for the navy, whose experience of the qualities of timber, produced upon different soils, must necessarily render them much better qualified to pronounce a correct opinion upon the subject, than any person, however learned, whose knowledge was derived only from books. But, had you done this, you must have admitted that I was the author of this system, so far as regards the application of manure; and that the "greatest writer of the age" had been guilty of more than a "trivial error," in his powerful "specimen of didactic writing," by denying the advantage of any preparation of the soil whatever. The honour of Scotland was, however, at stake, and you were reluctant to make either of these admissions.

The Edinburgh Reviewers charge me with arrogance and presumption, in attempting to "instruct the English nation in the management of plantations, and the commissioners "of woods and forests how to improve those "royal domains, by raising the best oak timber for the navy," an office for which, they say, I cannot be qualified, because I am unacquainted with phytological science. But you admit, that Sir Walter Scott possesses "no accurate knowledge of phytology, and "that some errors both in the theory and the "practice have crept into his essay;" and yet you extol him to the skies, as being eminently qualified to instruct the public in the art of planting, and modestly describe his essay "as "one of the most powerful, judicious, and "*useful practical* tracts existing in the language."

I wish to avoid every thing like personality or national prejudice, but it really seems as if gentlemen on the other side the Tweed can never be essentially wrong; that they never commit more than a "trivial error;" and that they are always ready, and always qualified, to instruct others on any subject, whether they be themselves acquainted with it or not. For instance, these Reviewers, whose lives are passed in cities and in literary pursuits, think themselves qualified to give a lesson on planting, a subject purely rural. Accordingly they tell us, that "the pitting "method is suited for *barren* lands, and the "trenching method is the best for *superior* "soils;" when any one who has not lived all his life in the atmosphere of a city knows, that trenching, though useful in all cases, is *absolutely necessary* for *barren* lands; and that, if it can in any instance be dispensed with, it is in the planting of *superior soils.* But where, upon your showing, can be the advantage of phytological science to the general planter? You say that the method recommended by Sir Walter Scott is the best, except under *peculiar circumstances;* and surely no scientific knowledge can be required to enable a man to raise a flag, and stick a tree into the ground.

I will now return to your grand objection, that the culture of the soil will have an injurious effect upon the quality of timber.

"The oak in the highland mountains of "Scotland or Wales," you say, "is of a much "harder and closer grain, and therefore more "durable, than what is found in England, "though in such mountains it seldom rises to "the *fifth part or less of the English tree.* "Every carpenter in Scotland knows the ex"traordinary difference between the durabili"ty of highland oak, and oak usually import"ed from England, for the spokes of wheels. "Every extensive timber-dealer is aware of the "superior hardness of oak raised in Cumber"land and Yorkshire, over that of Mon"mouthshire and *Herefordshire.*" As to the waggon-spokes, the trees which would be preferred by the Scotch artisan for that purpose, would, I imagine, be but of little use in building a man of war of the first class; and with regard to the superior quality of oak raised in Scotland, in Cumberland, and in Yorkshire, I think you are wrong in point of *fact.* A gentleman, who possesses great scientific knowledge and experience on this subject (a conversation with whom will be detailed hereafter) states, that "The oak timber of the "south of England generally is more durable "than that of the north, and that from the "warm parts of the world better than from "the colder climates." He observes, "if "you look at the progress an oak has made in "one year it will be solid; but, between each "year's growth, there is a porous space, the "more frequent recurrence of which in a "given piece of timber (which will be the "consequence of poor soil) must necessarily "lessen the quantity of solid wood."

This gentleman instanced Sussex and *Herefordshire* as rich counties, and producing better oak than the neighbourhood of ———, a midland county; and said he conceived, that ground which would bear the best crops of wheat, for an average of years, would produce the most durable oak timber. The opinion of Mr. Knight, the eminent and learned President of the Horticultural Society, is to the same effect. That gentleman's answer to the query put by Lord Glenbervie—"Whether

“ oaks, which grow in poor soils and slowly, “ are of a firmer nature and more durable timber than when grown in richer land ?” was as follows:

“ No: their timber is more *porous, lighter*, and *less durable*. The heaviest and best “ oaks for *all* purposes grow in strong deep red “ loams, where the oak frequently increases “ annually more than an inch in diameter. A “ layer of very porous wood marks the commencement of each year's growth; and when “ the growth is small, these *porous layers touch* “ *each other*. The superior value of the English oak *depends on its vigorous and rapid* “ *growth*, which frequently exceeds that of the “ oak imported from the north of Europe “ in the *ratio of ten to one*.”

The authority of this gentleman I am sure you will not dispute; and when to these opinions you add the fact (which I have from authority), that it formerly was a “ standing rule “ with the government, in the making of contracts for building ships of war, to give a “ preference to the timber of the growth of

" Sussex and Kent, and to exclude that of " other counties, particularly of the growth " of some parts of Yorkshire," I think you will see reason to doubt the correctness of your statement, that timber grown in the north is superior in quality to that grown in the south.

Another of your positions is also, I submit, expressed in terms too general. You say, that a " certain *slowness* of growth is essen- " tially necessary to the closeness of texture and " durability of *all* timber." The locust is certainly an instance to the contrary. That tree grows twice as fast as the oak, is more than twice as durable, much closer in texture, and it has been proved by experiment that, in strength, it exceeds the best oak in the proportion of at least one fourth. I have collected a number of important facts respecting this valuable wood, which it is my intention to publish as soon as I can find time to arrange my materials.

The teak tree is another exception. This wood is much harder and more durable than oak; and being the production of an East Indian climate, the growth must necessarily be more rapid. It is found more than two hundred feet high, a height which it is impossible for a slow-growing tree to attain. "The stem, "the branches, and the leaves, are all very "imposing. On the banks of the river Irra-"waddy, in the Birman empire, the teak "forests are unrivalled; and they rise so far "over the jungle or brushwood, by which "tropical forests are usually rendered impene-"trable, that they seem almost as if one fo-"rest were raised on gigantic poles over the "top of another."*

Our common elder is another proof that *quickness* of growth is not inconsistent with hardness and durability of wood. "There is "scarcely any tree," says Mr. Cobbett, "which shoots so far in a year as the elder; "yet, even in its young state, it is a very "hard and durable wood. For the first year, "the shoot is absolutely hollow: it is a piece "of pith surrounded by a crust of wood; and

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* Library of Entertaining Knowledge, vol. 2, p. 20.

" every man knows that, when a boy, he has " made pop-guns of it. In the third year " of its growth, however, the wood gets rid " of this pith, and by the end of the fourth " or fifth, the shoot will make a stake, " the durability of which has long been so " proverbial, as to give rise to the following " couplet:

" An ELDER stake and a hazel heather
" Will make a hedge to last for ever."

" The reader must know, that the stakes are " the upright supporters of the hedge; but he " may not so well know, that the *heather*, " which ought perhaps to be *header*, are the " rods which are put along on the top or head " of the hedge to fasten the bushes, or other " stuff down."*

Many other instances might I have no doubt be given; but these are quite sufficient to show the incorrectness of your opinion, " that slowness of growth is essentially neces-

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* Woodlands, paragraph 222.

“ sary to the closeness of texture and durability
“ of *all* timber.”

You admit, that trees will grow much faster, and become much larger upon a rich deep soil, than upon land of inferior quality. In the quotation before given from the sixth section of your work, a section written for the purpose of showing the *necessity* and importance both of *trenching and manuring*, you state “ that little park timber is found in Scotland, “ or the north of England, approaching in “ size and grandeur to the great trees in the “ midland and southern counties, *owing* proba- “ bly to the *superior soils* which exist in those “ districts.” These large and grand trees, I presume, you will not contend are unfit for naval purposes. Indeed it is notorious, that the finest and largest trees (which can only be produced upon good soils) are almost invariably selected by the contractors. If, therefore, the timber which is preferred in the King's dockyards is grown upon the richest soils, how can it be possible that a naturally poor soil, when *enriched* and improved, should produce trees of worse quality, or less suitable for naval purposes, than it would have done if left in its original state of poverty and sterility?

It would, I believe, be impossible, by any aid which could be given to very poor soils, to produce such a permanently rapid growth of timber as will take place on those which are naturally *rich*; but why the improvement of the poor soil, and its approximation to the rich one, should lessen the quality and value of trees grown upon it, when it is admitted that rich soils produce the largest and best timber for ship-building, is a problem, the solution of which I must leave to the votaries of mere science—to those philosophers who attempt to extract "sunbeams from cucum-"bers," or to "calcine ice into gunpow-"der."*

Your recommendation of the trenching and manuring system for profitable planting, and your objection to it for raising trees for the navy, implies an opinion, as before stated, that timber for the latter purpose is almost entirely supplied from the royal forests. That the contrary is the fact, is well known to every one in *England* at all acquainted with country affairs; and I am surprised, that before you undertook to defend the system of planting practised in those forests, you should not have been better informed. I, who am quite ignorant of phytological or chemical science, was quite aware, that almost all the finest oak timber, felled upon gentlemen's estates, found its way into his Majesty's dock-yards; but what proportion of the whole quantity there used was so obtained, I could not of course know. After reading your book I made enquiry, and received the information from the same *official* quarter to which I have before alluded. This part of the communication was as follows:

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* See Gulliver's Travels.

"The various forests of the government do "not produce, on an average, more than one "sixteenth of the oak timber consumed in his "Majesty's yards; the remainder is collected "in the various parts of the kingdom, without having regard as heretofore to the part "of the kingdom in which it grows. It "should however be borne in mind, that in "the fifteen sixteenths, to be procured to "make up for the deficiency of the forests, "there is a quantity of East India teak "imported, and of late a timber from the "coast of Africa has been introduced, designated "by some African teak, by others oak, "but known in the dock-yards as African "timber, No. I. This timber stands very "high in the estimation of practical men. "It is more ponderous than oak, but its "strength is much superior, so that its dimensions "are reduced in the proportion "of what it exceeds the oak in specific "gravity; and with respect to its durability, "it is considered very superior to the oak."

The facts here stated, that not more than one sixteenth part of the oak timber used in the dock-yards is supplied by the royal forests, and that, with the exception of the timber imported, the remainder is collected indiscriminately from various parts of the kingdom, are quite conclusive against your argument. The proportion is so small, that the quality, even if inferior, can produce but little effect among so large a quantity; and if the timber in general, which is now used in the King's yards, be fit for ship-building, it will be difficult for you to show, that the adoption of the proposed system of planting in the forests can materially alter its character. It is evident, that a large proportion of our naval timber has been and must always be obtained from private estates, that the largest and finest trees are preferred, and that these can only be obtained from rich lands where the growth has been rapid: and if the quality be on that account less valuable, it is an evil which has always existed and must continue to exist, whatever mode of planting may be adopted in the forests. Is it not puerile therefore to contend, that the safety of the navy requires that the timber in the FORESTS should be of *slow* growth, when the great proportion obtained elsewhere, if to be fit for naval purposes, must *necessarily have grown quickly*.

If you had taken the trouble to collect information from men of experience, you would never have fallen into so palpable an error. If you had asked the opinion of those who have been in the habit of converting timber, you would have found, that the very reverse of your proposition is true, and that fast-growing timber, when *arrived at maturity*, is almost invariably found to be of better quality, and to possess greater strength, toughness, and durability, than that of slower growth. I have taken some pains to collect information on this point from the most respectable and unquestionable sources, a portion of which I will now lay before the public, *premising* that I put the following question to most of my correspondents: "Whether you have found, that "fine fast-growing oak timber, when arrived "at maturity, was inferior in quality to timber of slower growth; and whether you "think, that the application of manure to "poor land at the time of planting, and "the cleaning of the land for a few years, can "have any injurious effect upon the quality of "the wood, when it has attained its full "growth."

The first gentleman I applied to was my friend Mr. George Trumper, of Warren Farm near Southall, Middlesex, from whom I received a letter, of which the following is an extract:

No. I.

"I have not seen Sir Henry Steuart's "Planter's Guide; but think he asserts a great "deal too much when he states, that fast-"grown timbers are unfit for naval purposes. "I have never been much concerned in the "conversion of timber, but have been active-"ly employed during the last thirty years "in the valuation and sale of it, in various "parts of the kingdom.

"The best trees from those I have sold "have been almost invariably selected for the "use of the navy, more particularly during "the war; and although they have not passed "immediately through my hands into the "King's yards, they have been sold by the "purchasers to John Morrice, esq. (or his "agents), who supplies nearly all the oak "timber to the several dock-yards: and in "the whole course of my practice, I never "heard the least objection made to fine fast-"grown timber, provided it was of sufficient

" size, and free from sap. Indeed there is no " part of the kingdom where oak timber " grows much faster than in that part of Kent, " called the Weald, and from thence through " Sussex, Surrey, and the woodland parts of " Hampshire, extending from Romney Marsh " (say Rye) to Tunbridge, East Grinstead, " Horsham, passing below Guildford through " the north side of Hampshire, nearly to " Newbury in Berkshire; and there is no " district which has supplied a greater quanti- " ty of naval timber, or in which higher prices " have been realized.

" I am now concerned for some very large " timbered estates in Northamptonshire and " Lincolnshire, where timber appears to be of " much slower growth than in the parts I " have mentioned; but I have never con- " sidered the quality good. The best descrip- " tion of oak is undoubtedly produced from " deep heavy soils, the grain of the wood " being strong and less liable to be *shaky* or " *red-hearted*, these defects being insuperable " objections to its being used for ship-build- " ing, or any other purpose where strong

" timber is required. In short, I have always " found a more ready sale for fine fast-grown " oak timber, of large dimensions, than I " could for any other."

The following communication is from a considerable land-owner, a gentleman, who, to great quickness of perception, unites a soundness of judgment, and an acquaintance with the principles and practice of rural economy, not often surpassed by those who pursue the subject as a profession:

No. II.

" I am much obliged to you for the loan of " Sir H. Steuart's book, the perusal of which " has in many respects afforded me considerable gratification, and indeed a very agreeable " disappointment. I heard it so highly spoken " of some time ago by a would-be planter, " and neighbour of yours, that I fully expected to have found the main object of the " work a justification of the cheap (I dare not " say Scotch) system, as opposed to the liberal " system of planting. There is not, however, " as far as I can see, a single passage in the

" body of the book to realize this expectation. " Sir Henry's system appears to me to be the " *ne plus ultra* of cultivation. Nothing here is " left to nature, at the same time nothing " is done in violation of her laws; and deser- " vedly rewarded he seems to have been, for " his spirited improvements in transplantation. " This has hitherto been a great *desideratum* in " the art of planting. The clump and belt " are certainly, at best, but meagre contri- " vances; and to raise wood in open dispo- " sitions from small trees, by other means, is " not only tedious and uncertain, but, if an " accurate account of the costs were kept, " would be found to be beyond all expectation " in point of expense. I care not whether Sir " Henry's anticipations of the longevity of his " trees are fully realized: supposing them " to last but a generation or two, they " have answered the object for which they " were intended, and their renewal, which " of course would only require to be gra- " dual, would be an easy matter, as every " estate ought to be able to furnish subjects. " I am here speaking only of ornamental " grounds near a house, which may be called

" the foreground of the landscape: for close " plantations, which are always at a comparatively greater distance, I should by no " means be disposed to recommend it. Plantations of very young trees produce considerable effect in a landscape at a little distance, " particularly where there is any variety of " ground, indeed as soon as the surface is hidden by the meeting of the branches, which " with proper management need not be long.

" I am also a little sceptical on the point of " comparative cheapness, except for small " groups, where the expense of fencing increases in a ratio far greater than one not in " the habit of attending to those matters would " expect. For instance, a plantation of an acre " might be trenched, and planted with manure " in the best possible manner, for about twenty pounds. A circle of about two hundred " and fifty yards would enclose this. A light " bank and ditch might be raised (including " repairs till the spring was strong enough to " protect itself) perhaps for sixpence a yard, " or three shillings and sixpence per rod. A " clump of ten rods would require a fence of

" more than sixty yards. The relative cost of
" the two, then, would stand thus :—for the
" acre, planting twenty pounds—fencing six
" pounds five shillings, or less than one fourth
" of the whole expense: for the ten rods,
" planting one pound five shillings, fencing
" something more than thirty shillings, being
" after the rate of twenty-four or twenty-five
" pounds per acre, not to add that the ditch,
" which might be passable when applied to a
" plantation of an acre, would not be bearable
" to any one, with the slightest pretensions to
" taste, round a patch of ten rods. Something
" lighter must be had recourse to, light railing
" or sheep-hurdles, according to the kind of
" stock kept, which would swell the account
" still more. Sir Henry's account, however,
" is a little overstrained, and fully proves that
" the baronet's acquaintance with the rules of
" arithmetic is by no means equal to his know-
" ledge of the laws of vegetable physiology.
" At page 358, there is a calculation of the ex-
" pense of raising timber from small plants, in
" small quantities, in which one item is for
" thirty years' rent of the land, on which the
" accumulated interest is afterwards charged,

" as if the whole had been expended in the " first instance: if, instead of this, the calcu- " lation had been made, as it ought, in the " nature of an annuity, the accumulation at " four per cent. (the rate Sir Henry seems to " have taken as his basis) would be about for- " ty-two pounds. The expense of railing, to " be renewed at intervals of six years, would " amount to about twenty-four pounds ten " shillings; the planting and hoeing to about " seven pounds ten shillings: in all about se- " venty-four pounds, being less than one half " of the estimate made by Sir Henry. In " transplanting large trees, the cost of the sub- " jects too will be something, more particular- " ly if they be oaks or Spanish chesnuts, if " every thing be taken into the account from " their first removal to the transplanting nur- " sery, where they must stand at from two to " three times the distance which would be ne- " cessary for grove-trees. For either of the " sorts above named, fifty trees is as many as " an acre ought to contain, supposing them to " be thirty feet high, if each tree is to be al- " lowed to extend itself in its natural propor- " tion. Making every allowance, however,

" for these omissions, the expense of small " clumps is immense when compared with the " transplanted trees.

" These observations have not been made " for the purpose of disparaging Sir Henry's " system, which, within its proper limits, I " think deserving the serious consideration of " every man who has a place either to make " or to keep up; but solely with a view of " showing the danger of relying upon what " are commonly called rough calculations, " Many an useful practical truth has been re- " jected, and consequently lost to the world, " in consequence of the indiscretion of its ad- " vocates in this respect. In the foregoing " observations I have all along proceeded on " the supposition, that the after-growth of " the trees is fully equal to Sir Henry's de- " scription, assuming as a matter of course, " independent of the collateral evidence fur- " nished by the Highland Society, that no " man of the rank and character of a gen- " tleman, however he might be disposed to " distort arguments for the purpose of bolster-

" ing up a favourite theory, or might deceive " himself as well as the public by erroneous " calculations, no such man would deliberately publish as *facts* statements which he " knew to be untrue.

" There is perhaps no part of the work " which has given me more unmixed satisfaction than the note on pruning (Note 5, " sect. 4, p. 440). I ought perhaps to say, the " practical part of that note. The mode of " pruning there recommended is precisely " the same, as that which I ventured to recommend to you some twelve months since; " and it is not a little singular, that the very " terms which Sir Henry takes to designate " the opposite method, are the very same " which on that occasion I made use of. The " method of pruning is the same as that on " which I gave you my opinion under the " name of *cutting in*, and the effects of that " mode are described by us as precisely the " same. I have long followed the practice, " which, as far as I am concerned, is solely the " result of my own observation on the mode of

" growth in trees, never having seen it practised elsewhere, or even having heard of it " till I saw Mr. Billington's book.

" With the whole of the theory of that " note I cannot agree, and here I am aware I " am treading upon delicate ground. I do " not pretend to much knowledge of vegetable " physiology, as a science, in which it must " be evident to every one Sir Henry is deeply " versed; but there are some things which I " cannot reconcile with the doctrines laid " down by him in other places. For instance, Sir Henry states, that the cutting " away a proportion of the branches tends to " turn the current of the *descending* sap more " abundantly into the stem. Now I confess I " do not quite comprehend this: I can easily " understand how, by the reduction of a part " of the lower branches of a tree, the current " of *ascending* sap may be increased in that " part of the stem, which is above the branches so cut off, and in the remaining branches; and as, in the case of pollards, we " constantly see after lopping, that the leaves " in the following year attain to double their "natural size, it is probable that the leaves "of the remaining branches of these trees are "proportionably increased, so that the whole "exhalent power is equal to what it would "have been, had the tree not been pruned "at all. The ascended sap would then be "elaborated in an equal degree; and what-"ever may be the exact process which nature "uses for the purpose (which is not I think "yet fully proved), the same quantity of "woody fibre would be formed, only differ-"ently disposed. Thus the *available weight* "of wood is increased while the *actual weight* "at most remains the same. If, however, "the pruning be so excessive that this adjust-"ment of the exhalent power do not take "place, the *actual weight* will be less. I will "not be presumptuous enough to assert, that "this is absolutely the case; still, any one "who will take the trouble to reflect on the "subject must allow, that nothing I have here "advanced is opposed to reason: but before "we subscribe to the doctrine, that trees are "increased in bulk (taking in all their parts) "by pruning, we have a right to call for more "substantial proofs than have been as yet

" exhibited by Sir Henry, or by the authors
" whom he has quoted.

" With regard to that part of the work in
" which your *ignorance* is exposed, there seem
" to me to be causes, other than mere contra-
" riety of opinion, necessary to account for so
" striking a deviation from the general tenour
" of the work. Your attack on national pre-
" judices or private attachments is hardly
" sufficient to account for it. Sir Henry here,
" in more than one instance, misquotes, or
" to speak more properly misrepresents you.
" The main object of your first pamphlet was
" not to recommend trenching, which, either
" with the spade or trench-plough, is the *gen-*
" *eral method* in this part of the country, at
" least with all who are worthy of the name of
" planters; but to show the advantages which
" would arise from the application of manure
" to forest-trees in *certain soils.* You have by
" no means, as far as I comprehend you,
" recommended the system as one of universal
" application, by which trees are to be un-
" naturally forced to a state of apparent matu-
" rity; but as one, by which the disadvanta-

“ ges under which the better sort of woods “ labour, on ordinary soils, may be in a con- “ siderable degree counteracted, by approxi- “ mating their growth to that natural to them “ on the soils best suited to them: nor is this “ effect, as far as I have been able to discover, “ any where stated as having been produced “ by the application of *fresh-made dung*.

“ Sir Henry (in p. 477, 8, and 9,) has “ laid down six postulates relative to the “ growth of trees, which in the main I am by “ no means prepared to controvert, or with “ some trifling exceptions even disposed to “ question. Of these the first, fourth, and “ fifth bear most directly on the present question. “ The fair deduction from them is, “ that the culture-system is that best adapted “ to the planting of waste lands, if these “ are intended to produce any thing more valuable “ than the birch or Scotch fir. I say “ the *culture-system*, rather than the *manuring-* “ *system*, as being more comprehensive; and “ there are many cases in which the mere “ comminution of the soil, by means of trenching, “ may be amply sufficient for every

" purpose, without the assistance of manure. " That system is not pretended to be necessary " to its full extent in all the royal forests, " and every part of them: how far it would " have been desirable in that part under the " management of Mr. Billington, against which " your attack was immediately directed, may " be safely left to the judgment of every candid and unprejudiced enquirer.

" Sir Henry, in confirmation of his arguments, refers to the editor of the Gardener's " Magazine. I am aware that Mr. Loudon " is high authority in the present day. No " one who has seen his bulky volumes will dispute his claim to very great *learning*, both in " the theory and practice of every branch of " rural economy; but his great work, the Encyclopædia of Gardening, is in many instances nothing more than a series of contradictory opinions, strung together conjunctively, without any decided opinion of his own " to assist the ignorant reader, and calculated " rather to mislead than instruct: as connected " with the present subject, his chapter on the " culture of plantations affords some striking

" proofs. In spite of such authority, I cannot " yet subscribe to the doctrine, that in any " part of the world one thousand acres of wood, " of *any sort*, confer more value on an estate " than the most thriving plantation of a few " acres. The contrary is, I think, quite cer- " tain; and is proved to demonstration in " your letter to Sir Walter Scott. One word " more on trenching: had Sir Henry careful- " ly perused your first pamphlet, and borne in " mind your excellent observations on the ef- " fects of cleaning the soil, and the principles " which produce those effects, he would not " lightly have accused you of not fully under- " standing the subject either in theory or prac- " tice. Sir Henry should have borne in mind, " that trenching is not the main object of the " pamphlet in question, but is merely men- " tioned incidentally as a part of the system of " culture.

" With regard to the effects of culture " upon the quality of timber, the grand ob- " jection *now* started against your system, Sir " Henry himself admits, that in the case of " trees situated in a worse soil and climate

" than that which is natural to them, the " extra increase of wood obtained by culture " will be of a quality not inferior to what in " its natural state it would have been; and " this admission makes entirely in favour of " your argument. I do not suppose you to be " sanguine enough to imagine, that the " growth of oak timber on Holt heath, or the " sheep-walk at **, can, by the most judi" cious system of culture, ever be brought to " equal that of Kimberley or ****, two spots " perhaps the best adapted to the growth of " oak of any in this county; but it is some" thing to approximate to that growth, and " still more to assimilate to the quality of tim" ber attendant on that growth, which, if " there be any truth in Sir Henry's position, " will be the case. It is not the fact, how" ever, that the strength of timber is in an " inverse ratio to the quickness of its growth: " the contrary is proved by every day's ex" perience—for instance, what wheelwright " in his senses would select a piece of *slowly* " *grown* ash, for the shafts of a light cart?

" I do not pretend to a knowledge of the

" qualities of wood, equal to that of men
" whose whole lives have been employed in
" the purchase and conversion of timber; but
" I have had some experience, and as far as
" that experience goes it is all in favour of the
" position, that the timber off a soil where it
" naturally grows fast, is far superior to that
" grown more slowly on poor hungry soils.
" The oak at ****, which I have just mentioned
" as a highly favourable soil, is tough and
" heavy, apt to warp, hard to saw, and very
" difficult to plane up; whilst at **, where
" it does not attain half the size of the other in
" any given period of time, it is comparative-
" ly light, and what the workmen term *mild*,
" that is to say, tender, short in the grain,
" sawing freely, and working up more after
" the manner of wainscot. I have not taken
" this opinion from hearsay; having always
" had a turn for mechanical pursuits, as well
" as a love for planting, I have been in the
" constant habit of personally superintending
" all repairs and alterations on my estate, and
" also the construction of all my farm-imple-
" ments; and having consequently made it
" my business to become acquainted with the

" relative properties of wood of the same and " different species, I give the above as one of " the results of my observations on that head.

" I regret much, whatever may be the " causes which have led to it, that Sir Henry " should have disfigured and, I may say, de" stroyed the unity of his otherwise excellent " book, by attacking a system in no wise op" posed to, but rather harmonising with his " own, as he has done in the note in question. " It has, however, afforded me a justification of " the old remark, that a man should go abroad " if he wishes to know what is going on at " home, if, as Sir Henry states, your own " friends have loudly condemned the style of " your letter to Sir Walter Scott. Apropos, " you never mentioned to me whether you " come over to their opinion yet.

" I fear this letter has already exceeded all " due bounds. I could, however, say much " more on this subject. It is one of which I " am never tired. I hope you are not yet suf" ficiently sick of it, to allow these Scotchmen " to imagine they have *discomfited you.*"

Extract of a letter from Messrs. John Barnard and Son, Timber-Merchants, Lambeth.

No. III.

"In reply to your questions, we beg to say "our experience, as to the former point, has "fully proved, that fast-growing oak timber "is generally superior to timber of slower "growth, as for instance Sussex oak, which is "fast-growing and most approved of for ship-"building purposes. As to the latter question, "we cannot but think, that any measure "which tends to enrich poor land must be beneficial to timber as well as all other vegetation, and that cleaning the land must prevent any reduction of the nutriment which "the plant receives from that source. With "these sentiments, we must concur with you. "A very large proportion of the timber used "in his Majesty's dock-yards is procured from "various parts of the kingdom."

Extract of a letter from Mr. William Norton, Timber-Merchant, Uxbridge.

No. IV.

" My opinion is, that you are very correct " in your plans of planting ; for it is impossible timber can grow too fast, provided they " will let it stand the same time they do slow-" growing timber. The misfortune generally " is, in marking for falling, they look to the " size, not to the state and condition of the " timber. Timber cannot be grown on too " good land or too highly cultivated. I have " always found the best timber on the best " land, and the more exposed the firmer the " timber. I also think, that if oak was fallen " in the autumn or winter we should not have " to complain of the dry rot."

The like from Mr. William Stenning, of Godstone.

No. V.

" I feel convinced, from my own little ex-" perience, that if the system which you have " advanced is followed up, viz. that of prepar-" ing, cleaning, and manuring the land, &c. " it will not only prove the surest and safest " method of increasing the growth of timber,

" but eventually be the most economical. I
" am therefore an advocate for your system,
" not only on that account, but because I am
" decidedly of opinion that fast-growing tim-
" ber, if it stand to *a proper age*, is more du-
" rable than that of longer growth."

Extract of a letter from Mr. John Stenning of East Grinstead.

No. VI.

" It is scarcely necessary that I should offer
" any remarks on your excellent publications,
" as what you have therein so ably stated is
" closely in conjunction with the opinions I
" have ever ventured to give on the subject;
" but those recommendations have generally
" met with the same result—they have been
" objected to in consequence of the expense,
" together with the difficulty of obtaining
" manure. In many situations in the coun-
" try where the distance to any large town is
" great, and there is a want of substitutes,
" such as marl, &c. the latter objection can
" scarcely be surmounted; yet, where ma-
" nure can easily be obtained, it is seldom

" had recourse to for the purpose of assisting
" the growth of timber. It may be here as
" well to observe, that what I may consider
" necessary to mention is more the result of
" casual observance, than of any extensive
" management of my own, as my experience
" is more particularly attached to the planting
" and improving of underwood. I have,
" however, bestowed sufficient attention to
" justify, in my opinion, your recommendations
" as regards the planting and general
" superintendance of forest-trees. You have
" noticed I dare say, as well as myself, that
" in shaws or hedgerows, at the lower part of
" hilly fields that are ploughed annually or
" oftener, trees which may have been planted,
" or sprung up where acorns may accidentally
" have fallen, are without exception infinitely
" superior to those growing by the upper
" sides or higher parts of the fields. This, I
" am convinced, is owing to the advantage
" of being constantly fed by the manure
" which is placed on the land for the crops;
" but, from the situation of the fields, is
" washed down by the rain, thereby nourishing
" and strengthening the growth of the trees

" or underwood that come within its reach. " Independently of this, I have no doubt the " growth is assisted by the ground, probably " on both sides of the hedgerow, being broken " up and loosened by the plough.

" Again, in woodlands the best timber and " underwood will be found growing where the " land is the most unlevel; for instance, where " the ground rises rapidly on each side of " a stream of water. This is undoubtedly to " be attributed to the soil in such situations " being invariably loose, and there scarcely " any weeds are to be found growing, as from " the quick growth of the timber and underwood they are overpowered. I mention " this, to confirm your opinion of the necessity " and the advantage to be derived from the " ground in all plantations being kept loose " and clean.

" The objection made by Sir Henry Steuart " to your system of raising trees is most absurd and ridiculous, and more at variance " with the fact, than any that has ever come " within my knowledge on any subject. It

“ may be considered presumption in so humble an individual as myself to write thus decidedly; but the obtrusiveness of Sir Henry’s objections to the quickness of the growth of timber is so palpable, that I cannot avoid expressing myself thus warmly. I will submit my observations principally on the production and quality of oak timber, but which will in my opinion apply equally to every sort of wood. It has ever been considered, by every person at all conversant with the quality of oak timber, that the very best description is obtained from soils, where the growth is the most rapid. In this neighbourhood, and throughout the country generally, the soil is particularly congenial for the quickness of the growth of oak timber; and Sir Henry Steuart would contend that it is to be objected to on that account, though it is proverbial, that it bears priority in sale and price in the market over timber grown in any other part of the kingdom, nay even in the world.

“ Certainly, the more rapid the growth of oak timber, the greater in proportion will be

" the sap (there are exceptions even to this); " but, I contend, that the *heart of such timber* " is infinitely to be preferred to the heart of " timber grown on thin sterile soils, or where " the growth from any cause has been re- " tarded. I know from experience, that the " former in similar situations (no matter what) " will endure one third as long again, if " not twice as long, as the latter. Another " very desirable quality which quick growing " timber possesses is, that it is much *stronger* " and *tougher* than that which grows slow. " The one would *bend* where the other would " *break*. I am convinced that a ship built " exclusively of quick growing timber, and " striking against a rock, would be in safety, " when one exclusively built of slow growing " timber would fall to pieces: the former, " from strength and toughness of the wood, " would yield and clear off; and the latter, " from the shortness of the grain of the wood, " and its consequent tenderness, would break " without reaction. I contend, in contradic- " tion to Sir Henry Steuart, that the heart " of the timber is very superior, that it is con- " siderably heavier, and must consequently "contain more virtue and condition, than "that which he recommends to the public "as the best.

"Independently of the advantage which "the quickness in growth gives to the quality "of oak timber, the bark from the same cause "possesses an equal if not greater superiority; "as the very highest price is given by the "London tanners for bark from this county, "where the growth, as I have before mentioned, is very rapid compared with its progress in many parts. The bark from such "timber is very thick and fleshy, whereas "from that which grows slowly it is thin and "drossy.

"The only inducement I have to fall in "with Sir Henry Steuart's notions on the "quality of timber, is the consideration, "'that the strength of work is the decay of "'trade.'

"Before concluding my remarks, I beg to "state that my observations are the result of "thirty years' experience: during that period

"I have superintended the management and "growth of oak timber, have purchased no "inconsiderable quantity, and have been a "good deal engaged in the conversion "and application of it for different pur- "poses; and I can assert, without fear of "contradiction from any experienced indi- "vidual, that *the quicker oak timber is pro- "duced, the better the quality will be.* What I "have stated are the unprejudiced and con- "scientious convictions and results of my "own experience; and should the simple "facts I have committed (for the first time) to "paper, prove of the least service to your "laudable endeavours, I shall consider myself "amply compensated."

Extract of a letter from John Kershaw, Esq. Timber-Merchant, Lambeth.

No. VII.

"You wish me to give my opinion, if fine "fast-growing oak timber, when arrived at "maturity, is inferior in quality to that of "a slower growth; and whether I think ma- "nure to poor land at the time of planting,

" and keeping it clean for a few years after, " can have any injurious effect upon the quality of the timber.

" In answer to these questions, I certainly " consider fast-growing oak timber, *when at* " *maturity*, is best, and indeed all other timber. With respect to manure on poor land " at planting, it can be of no consequence in " my opinion to timber, particularly to oak, " as that wholly depends on the subsoil for its " growth to perfection. As you of course are " aware, the tap-root will quickly find its " way through the upper soil, and then manure can have no effect. For instance, the " best oak of this country's growth is supposed " to grow in Sussex, with the parts of Surrey " and Kent on its borders; and the oak " grown in those parts is found the quickest, " strongest, and most lasting timber. It " grows on stiff clay, and the woods are " always well-stocked with young timber, and " planted only by the hand of providence.

" I hold with you that, at first planting, "open sterile land, although it may have a "good subsoil, should be well cleaned, and if "seeds are planted manure will be useful; "but all the manure and care possible will not "produce good oak timber when the tree is at "maturity, if the subsoil is not congenial to "its nature, although strong plants may be "raised at first.

"I have seen lands in the most remote "parts of Sussex (where manure was not to be "had) ploughed up and sown with acorns, "nuts, &c. and have a good effect on the pro-"duce, although the land was very poor.

"I have been through the forest of Dean "and other forests, and I must confess in "some instances, the method is bad, the plants "being taken out of the seed-bed too soon; "and they have been planted too thin with "the land *very foul, which certainly ought not* "*to be.* Here I again hold with you, that the "plants should be kept clean until they rise "above the weeds and filth about them, after "which they want very little attention for

" some years. I remember some years back, " when the plants in the forest of Dean had " arrived to three or four feet in height, they " were attacked by the large field-mice, which " destroyed a large portion of those then planted, " and a quantity was brought to a private " museum in this neighbourhood, and exhibited " to the friends of the proprietor as a specimen " of the destruction of the *Buonaparte* " rats, which had attacked the whole forest " to prevent the British navy being kept up. " However, taking the forest of Dean altogether, " it is *capable of producing a large* " *quantity of good timber of all sorts:* at the " same time *it wants skilful management*, " taking the parts most congenial to each sort; " and if the divisions were inclosed in parts of " from one to two hundred acres and *once* " *established,* there would not be any want of " young timber in future, taking care to " cut the underwood carefully at about fourteen " years' growth, and thinning out such " parts as may be considered necessary. But " I very much fear, that public woods and forests " will never have the care of private property.

Extract of a letter from Mr. Samuel Farrow, Timber-Merchant, Diss, Norfolk.

No. VIII.

"I have not had so much experience in "observing the particulars in the growth of "the different kinds of timber, as I have in "buying, selling, or converting it; but having "been doing considerable business in timber "for the last twenty-four years and upwards "on my own account, and for eight years "previously as an assistant to my father, I "flatter myself to have some judgment as to "quality. Sir Henry Steuart's argument "about fast-growing timber being inferior in "quality to the slow-growing, in my opinion, "must fall to the ground with every practical "man. It has always been a custom with "me, when I wanted a mild and tender "piece of oak for any purpose, to look out "for a slow-growing tree to cut it out of; "and on the contrary, when hard wood was "wanted, to take the fast-growing tree, one "which before being felled was in full and "rapid growth, and I have ever found the "latter much the most durable wood.

“ Since reading your letter, I have made “ an appeal to two or three of my sawyers “ (men of long experience) upon the subject, “ and they fully bear me out in what I have “ here stated. Oak is the only wood I have “ been led so often particularly to remark; “ but in converting ash I have frequently ob- “ served, that the *fast-grown trees* from a *good* “ soil were *very considerably tougher and hard-* “ *er* than those taken from *inferior* soils, and “ consequently much better for the uses to “ which such timber is applied, being able “ to *carry more weight* in proportion to the “ scantling and of *more lasting* quality.

“ I conclude this by saying, that my firm “ opinion is, that the better the soil the faster “ the timber will grow; and that such timber “ is much preferable for lasting purposes, than “ that which grows at a slower rate.”

The following admirable communication is from the able and scientific Editor of the Domestic Gardener’s Manual.

No. IX.

"In replying to your inquiry, whether I "conceive the application of manure to *poor* "land at the time of planting, can have any "injurious effect upon the quality of the timber, I must observe, that many writers, "chiefly I believe of the Scotch school, are of "opinion, that to interfere with the growth of "*forest*-trees is but to injure them: thus, I "read in the third volume of the Library of "Entertaining Knowledge, (part 1, p. 166), "'The wood of these two genera (Prunus and "'Mespilus) is close and compact, and takes a "'good polish; that of the *wild* sorts being "'*better* than that of the cultivated, and the "'*deterioration being in proportion* to the "'highness of the cultivation. In this they "'follow the general law, that self-planted "'trees yield the best timber,' &c; but these "assertions are of little weight with me, who "know, that men can believe and assert any "thing.

"*I* believe, that *manure* is of vast and "essential utility to forest as well as the garden trees, and *that* for the following reasons. On another occasion (Gardener's Manual, p. 16) I have observed, that the pure earths alone do not perform any material part in the process of vegetable nutrition: they may be considered as the *media* by which the plant is *supported*, and through which it is enabled to supply itself with the aliment necessary to the growth or developement of its parts. This aliment appears to be furnished, either by decayed vegetation naturally (i. e. by absorption of the products of natural fermentation, either from the surface of the ground or floating in the atmosphere), or artificially, and chiefly by the organic materials applied by labour. Vegetables are found to be resolvable into the elements carbon, oxygen, and hydrogen. Hence they must require for their food, such substances as are capable of producing the like elements (21).

“ Now, as the native earths are chiefly metallic oxides, it follows of necessity that plants are nourished either by water alone, and therefore that water is the origin of all hydro-carbonous bases; or that vegetable

" and animal manures are the sources from " which trees and plants more readily derive " their nourishment. I *believe*, indeed, that " plants are nature's own immediate electrical " agents, and that all hydro-carbonous combi-" nations are in fact but infinitely varied modi-" fications of the elements of water; that *at-" mospheric air* also is one of these modifica-" tions: but this is to view *primary causes*, to " look into the first principles of created things. " If we are to investigate the immediate " agents concerned in the work of vegetable " nutrition; I should say, that, the tree being " a hydro-carbonous body, requires for its " support, that the supply of food to its root " should be of such a nature as may afford the " readiest means of assimilation. Now vege-" table and animal substances, when subject-" ed to fermentation, furnish solid, fluid, and " gaseous matters, containing all the elements " of the vegetable structure, which elements, " when blended with the earths, are distribu-" ted to the roots and are taken up by their " vascular system. Manures therefore must " be of essential utility in promoting the vi-" gour and growth of trees.

“ If we enquire into the causes that promote
“ vegetable growth, I should say, that I
“ cannot but think, nay firmly believe, every
“ pointed termination of the leaves, twigs,
“ buds, every bristle and prickle, to be an
“ efficient agent in inducing atmospheric decompositions.
“ At p. 98 of your Letter to
“ Scott, you have introduced the following
“ most philosophic quotation, which bears
“ upon my theory : “ ‘ If you deprive a tree
“ ‘ of its leaves or mouths, the roots are
“ ‘ unable to obtain that which enables them
“ ‘ to perform their functions. Nature is
“ ‘ true to herself. The single tree sends
“ ‘ out its branches to catch and inhale every
“ ‘ thing conducive to its productive powers.
“ ‘ Where trees are thickly planted, nature
“ ‘ directs them upwards, to obtain that
“ ‘ which their situation prevents their getting
“ ‘ in a lower medium ; consequently you observe
“ ‘ the lower boughs are thin and weak
“ ‘ within, and fall off, whilst, in a young
“ ‘ healthy tree, the topmost shoots exhibit
“ ‘ vigour, aud will make more wood upward
“ ‘ in a given time than trees that stand sin-

" ' gly; and hence the great length that trees
" ' attain in woods.'*

" The agency of light induces the ascent of " the sap in the spring, at the moment that it " propels downwards the descending laborated " juices: thus, from the moment of the first " germination of the seed, the descending and " ascending fluids are co-existent; and the " solar light, in its passage through the vegetable vessels, operates by induction, and attracts those fluids which have been prepared " *in the soil* by electro-chemical agency, in " the immediate neighbourhood of the rootlets " of plants, and brings them into the sap-vessels, whence they are distributed into appropriate cells; wherein they are further laborated by the agency of that *lateral attraction*, " which I think is the real basis on which rests " the theory of *Endosmose* of Dutrochet.

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* This quotation is from the pen of my friend, Mr. John Doughty of Brockdish near Harleston, a gentleman whose intimate knowledge of every subject connected with the planting, management, and conversion of timber is well known.

" I will not enlarge here, or anticipate that " which I hope may soon appear at large " in my work. What I have said leads to " a two-fold deduction. The first is, that " every twig, having a vital function to per- " form, is of vital consequence to the plant " or tree: hence to cut off a twig or to " remove a bud, unless it be diseased, is in " fact a *bonâ fide* act of destruction on an " essential member. I therefore consider all " loppings and prunings to be injurious, when " *bulk of timber* is the object in view; and al- " though we prune and disbud wall fruit-trees " to obtain fruit-buds within certain given li- " mits, we certainly do any thing thereby " but improve the strength and vitality of the " tree, in as much as regards its bulk in tim- " ber and its ultimate duration. On natu- " ral and philosophical principles, I *therefore* " *disclaim against lopping and pruning* TIMBER- " TREES.

" The second deduction is, that as trees " and plants of all kinds are hydro-carbonous " bodies, the supply of food to the roots of " such bodies should be of a nature as nearly as

“ possible resembling the component parts “ of the body to be nourished; and therefore manures are and must be of real utility “ to trees and plants of almost every description.

“ As to trenching and pulverization all “ writers are agreed. One and all declare for “ the utility of such operations. It were “ therefore a mere wasting of time, to say any “ thing more on a matter that has been urged “ by every writer on horticultural subjects.”

The following letter from Henry Boys, Esq., of Malmains near Wingham, Kent, is important as showing the great profit to be derived from judicious planting.

No. X.

“ On Tuesday last I had the gratification “ of receiving your two very interesting “ pamphlets on planting, for which I beg to “ return you my best thanks. I have read “ them both with the greatest delight, and “ most fully accord with you, that good cultivation amongst forest-trees is as essentially

" necessary to insure success, as it is in every " other production of the earth. It is my " misfortune to be situated ' on a barren waste " ' in which no salutary plant takes root,' so " that it is not in my power to give you any " practical information as to forest-trees. I " have planted at different times between " seven and eight acres of land, and have invariably trenched eighteen inches deep, at " an expense of eighteen-pence per perch, " and have succeeded beyond my expectations. My late father planted two acres " and a half of poor land *well trenched*, with " larch at two feet and a half distant. At " about twenty-five years' growth, he sold the " land to a gentleman possessing the adjoining " property, reserving to himself the right of " cutting down every other plant, the remainder to be valued by Mr. Elgar of " Wingham and Mr. Whitfield of Ashford. The valuation was returned thus: " Best-use poles, 509—second ditto, 1133— " best hop-poles, 2698—seconds, 850—thirds, " 650—faggots, 2985—value £332 3*s*. So " that this poor land, which was not worth " more than twenty pounds per acre, in twen-

" ty-five years produced the enormous sum " of six hundred and sixty-four pounds six shil- " lings. The purchaser in consequence plan- " ted upwards of twenty acres adjoining, and " from following the Scotch system of not " trenching, a great portion is *a total failure.* " One side of the plantation is fenced by a " ditch dug three feet deep; and where the " chalk was spread, the plants are considera- " bly higher and are still alive."

The following communications are from gentlemen belonging to or connected with his Majesty's dock-yards.

No. XI.

" With reference to the objection started " by Sir Henry Steuart, I am sorry I do not " feel myself competent to give a *decided* opi- " nion, my investigations on the subject of " timber having been almost entirely mathe- " matical, that is, in estimating the strain " and resistance it is exposed to and offers " in different combinations, employed in ar- " chitectural and other constructions, and in " estimating the comparative strength of dif-

" ferent species of wood. When I was carrying on the latter class of experiments, I had
" much conversation with the different officers
" of the dock-yard here, on these and other
" practical points; and I know it was the decided opinion of those gentlemen, and I
" have proved it by experiment, that different
" specimens of English oak vary in their comparative strength in the proportion of five to
" four, and in some cases in the proportion of
" seven to five, and that they always considered the strongest and best to be the produce
" of the best soil. The grain was straighter,
" and more compact and dense, and of brighter colour.

" Now it certainly does appear to me,
" that cultivating and cleaning indifferent
" land, prior to and subsequent to planting, is
" calculated to make it approximate so much
" nearer in its effect to a soil naturally good;
" and if so, and if the above deductions be
" correct, to the production of better timber.
" This at least appears to me to be a reasonable conclusion, and I much regret that
" I had not, when I was engaged in these pur-

" suits, made more particular enquiries as to " the soil and circumstances of the growth of " the trees, in which case I should have been " better able to have answered your enquiries " in a way more satisfactory to you and to " myself."

No. XII.

" The gentlemen I applied to in the dock-" yard, who are perhaps the best informed on " the subject, have never heard of any differ-" ence in price or building-value being made " in the King's yard, on account of the quick-" ness or slowness of the growth of oak of the " same species. The price depends on the " form and size; and I feel no doubt but oaks, " nurtured as you propose, and therefore " larger and finer, supposed to be of the proper " species, would be more esteemed for naval " purposes than any other not so fine as to " form and size.

" Since I received your letters, I have ob-" served, on a small piece of ground belong-" ing to me, a fact respecting the growth of " oaks worth a volume of mere opinions. The

“ ground is partly the site of an old castle
“ (supposed Roman), and partly of old chalk-
“ pits. The oaks are generally very poor and
“ stinted, but there is one remarkable excep-
“ tion in a *very noble oak* standing on a kind
“ of mount. In cutting part of this mount a
“ few days ago I discovered it to be *made*
“ ground, partly clay and partly black and
“ rich ashes, thrown from (I doubt not) ancient
“ brick-kilns or potteries.”

Another communication from the same gentleman.

No. XIII.

“ I am quite convinced of the truth of
“ your observations respecting the planting of
“ oak, both as to the propriety of preparing
“ the immediate spot for the young trees, and
“ of a general preparation in draining, &c.
“ of the intermediate ground. I think no one
“ can walk through the forests in this neigh-
“ bourhood, without at once wishing for the
“ adoption of your plan. You may see here
“ acres on acres of *miserable* oaks; some crowd-
“ ed together, some at too great a distance,
“ some in swamps, some in impenetrable stuff;

" while on stepping out of this plantation " of British oak, you may see *fine* Sussex trees " in hedgerows, &c. where the *ground has* " *been attended to* for other purposes."

No. XIV.

" With respect to the preparation of the " soil previous to planting, and keeping it " clean afterwards, as far as my judgment " leads me, I am of opinion, if it were adopted in the public forests, it would not fail of " being highly beneficial; and the timber " arising therefrom would *unquestionably be fit* " *for any purpose.*

" I have been formerly acquainted with " some of the King's forests, and am con- " vinced, *if your plan were adopted, they would* " *not only be incalculably more productive of tim-* " *ber fit for the public service, but of a quality in* " *no respect inferior to any that we receive from* " *them.*

" *I have endeavoured to conceive a real and* " *substantial objection to your plan, but confess* " *that I cannot succeed.* The only question

“ that suggests itself, is the immediate expense “ and the very remote return,* which, however, is answered by the paramount question of the national security to which it “ tends.

“ The timber delivered at this yard is from “ the forests of Whittlewood, Salcey, and “ Whichwood; and forms but a very *inconsiderable proportion* to what is sent by the contractors, which is from almost every part of “ the kingdom.

“ I am of opinion, if timber could be cut “ down at the age of eighty or ninety years, “ it would be *far better for ship-building* than “ one hundred and twenty years; and I have “ ever found young timber that would side “ from thirteen to sixteen inches *exceedingly* “ *good*, and not inferior to slower growth. I “ incline also to the opinion, that immense “ tracts of waste land in various parts of the “ kingdom might be planted with great suc-

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* The return is much quicker than by any other method.

" cess, both as a private speculation, as well " as essentially advancing a national benefit; " and lands that have long been devoted to " the growth of timber, might be more beneficially subjected to the plough.

" In a question in which the public good " may be promoted in so important a manner, " I am happy to find one of so much intelligence and so well calculated to advance the " question is turning his attention to it; and " I most sincerely wish you success in the farther prosecution of your researches and " plans, upon this important and interesting " subject."

No. XV.

" Being a native of, and having spent " nearly the whole of my time in a sea-port, " I have never seen a tree of any sort planted; " and therefore must honestly confess, that it " would be the highest elevation of presumption in me, to offer an opinion on any thing " connected with the practice of planting.

" Respecting the public forests, **Dean** is

“ the only one, the produce of which I am “ acquainted with. I can assure you, from a “ long experience, that the oak timber from “ thence is *far inferior in quality* to what the “ contractor for English timber obtains of the “ landed proprietors. The timber, the *pro-“ duce of upwards of ten counties,* usually “ shipped at the port of Chepstow by the con-“ tractor, is very superior in quality to what “ is supplied from the forest of Dean. I “ quote Chepstow, as I am better acquainted “ with the quality of the oak timber shipped “ at that place than with any other.

“ Whether fast-growing oak timber differs “ in quality from timber of slower growth, I “ have not the means of forming an opinion, “ as I never survey the trees standing; and as “ they are all squared or sided before they are “ delivered at the dock-yards, their history “ comes not within the scope of my observa-“ tion.

“ What proportion of the timber used in “ the *whole* of the dock-yards is supplied from “ the royal forests, I am not able to ascertain;

" in *this* yard, it bears a very small proportion. You are correct in your opinion that " the oak timber delivered by contract is obtained from various parts of the kingdom, " wherever it can be had, *without enquiry* " *being made as to the soil upon which it was* " *grown.*"

No. XVI.

" In reply to your letter, requesting that I " would give you my opinion, from the result " of my experience in the converting and " working of timber, whether I have found " that fine fast-growing oak timber, when arrived at maturity, has been inferior in quality to timber of slower growth, &c; I can " only say that I have found by experience, " that timber of hard texture is more durable " than soft, and trees that have braved the " storms in open exposed situations, and " maintained life so as to reach the middle " size of oak timber in general, having smaller " capillary tubes and containing less juices, " are closer in texture, so that when they are " cut down they have less to evaporate, and " are less porous and harder in consequence. " Such timber I have found to be more dura-

"ble than large, overgrown, fine-looking "oaks, which are full of moisture.

"With regard to the application of manure to *poor* lands at the *first* planting, I "think it is right to set the trees growing as "you have so ably described; but it ought "not, in my humble opinion, to be continued "when the trees are getting on.

"Your method of ploughing, &c. before "you begin to plant, and keeping the land "clean afterwards, is excellent."

Although some passages of the following letter have already appeared in pages 13, 48, and 54; yet the communication is altogether so important, and comes from a gentleman standing so high as a practical and scientific ship-builder, that I hope the reader will excuse me for publishing it entire.

No. XVII.

"I had the honour of receiving your Memoir on the planting and rearing of Forest-"Trees, also your Letter to Sir Walter Scott

" on that subject, for which permit me to " offer you my best thanks, and also my " apology for not having acknowledged the " receipt of them earlier, which has arisen " from circumstances that I had not the power " to controul. I need not state to you, that " the subject which you have so ably treated " is one, upon which my avocations do not " give me an opportunity of speaking from " knowledge that has arisen from practice: " on the contrary, my pursuit may be considered more as that of an anatomist of timber, than that of a rearer of it.

" With respect to the opinion of Sir Henry " Steuart as stated in his Planter's Guide, " lately published, that your mode of preparing the soil would facilitate the decay of " timber, it is a doctrine *quite new* to me. " That the various counties produce a different description of timber in point of quality, " there can be no doubt. This was well " known to our forefathers, as it was a *standing* " *rule* with the government, in the making of " contracts for building ships of war, to give " a preference to the timber of the growth of

" Sussex and Kent, and to *exclude* that of
" others, particularly of the growth of *some*
" *parts of Yorkshire ;* but that any one could
" consider, that the preparing of the soil and
" keeping it clean from weeds, &c. by which
" greater growth should be obtained, would
" thereby facilitate decay and reduce its
" strength when applied to the purposes for
" which it was reared, I should as soon believe
" that the animal that was well attended to in
" its infancy, and thereby increased in growth
" and I should say in strength, would have
" its life shortened and its strength reduced
" thereby.

" The various forests of the government do
" not produce, on an average, more than one
" sixteenth of the oak timber consumed in his
" Majesty's yards: the remainder is collected
" in the various parts of the kingdom, without
" having regard, as heretofore, to the part of
" the kingdom in which it grows. It should
" however be borne in mind, that in the fifteen
" sixteenths to be procured, to make up
" for the deficiency of the forests, there is a
" quantity of East India teak imported, and

" of late a timber from the coast of Africa " has been introduced, designated by some " African teak, by others oak, but known in " the dock-yards by the term African timber, " No. 1. This timber stands very high in the " estimation of practical men: it is more " ponderous than oak; but its strength is " much superior, so that its dimensions are re- " duced in the proportion of what it exceeds " the oak in its specific gravity; and with re- " spect to its durability, it is considered very " superior to the oak.

" My time is much occupied, which will " account for my not entering more fully into " this subject. I trust that you will live long " to see the fruits of your labours, &c."

Extract of a letter from G. W. Johnson, Esq., of Great Totham, Essex, the eminent writer on Horticultural and Agricultural Chemistry.

No. XVIII.

" It cannot be denied by any one that the " art of cultivating plants, whether trees or " herbs, is carried nearest to perfection, if

" their health is an object, by affording to " them a soil and climate as much as possible " assimilated to that in which they naturally " flourish. The oak, for example, is a native " of England. It is always found to attain " the greatest size, and to produce the soundest timber, when grown on a fertile corn-" soil, at a moderate elevation above the sea. " Authority with many persons is conclusive " evidence; and for the satisfaction of such I " can state, that in a reference I have had occasion to make to all English works on the " cultivation of the soil, for a History of our " National Gardening I have now in the press, " not one, from the days of Tusser until those " in which we are now living, but agrees in " the result of experience thus stated by Cooke " in his Manner of raising and improving " Trees in 1769:

" ' Where a tree grows *most* in a year, *that* " ' *oak is the toughest timber.* A light brick-" ' earth, or a loamy clay, produceth the " ' stateliest oaks soonest, and *toughest timber,* " ' for they *there grow quickest.* Gravel pro-" ' duceth many oaks and straight: they

" ' grow slow, the timber is fine, and they " ' *decay* while they are *young*' (p. 37).

" Such has been the universal declaration " of practical men, as I could prove by multiplied quotations, and science holds the " same tenet.

" It is well known to every physiological botanist, that a plant, growing in a soil " deficient in decaying organized matters, " is of stinted stem, and generally dwarfish " growth, owing to its powers of vegetation " being employed in extending its roots, and " thus to acquire from an extent of surface, " that which it might obtain in a much narrower space of fertile earth. This is an unnatural mode of growth ; and to say that it " is wrong, if such was prevented by a moderate application of manure and judicious tillage, is to say that a diseased tree is likely to " produce the soundest timber.

" I am not defending a theory which maintains, that trees grown in the excessive richness of a hot-bed are of the greatest health

“ and longevity : I only advocate, that a mo-
“ derate supply of decomposing vegetable or
“ animal matter is required by every tree, and
“ that the course of culture which secures it to
“ them is both theoretically and practically
“ best. Those who support the opinion, that
“ a poor soil, and consequently a slow growth,
“ is to be preferred for timber-trees, can surely
“ never have studied vegetable physiology ;
“ for by the facts it developes they are as un-
“ supported, as in an economical point of view
“ they are wrong. In a poor soil, the vigour
“ of a plant is exhausted in the extension of its
“ roots ; in a fertile one, in the developement
“ of its superior organization : and if a healthy
“ plant is duly supplied with food, from
“ which alone it obtains the means of extend-
“ ing its organs, and completing their deve-
“ lopement, it will require more than the bare
“ assertion of the northern Aristarchi to show,
“ that such healthy vegetation is to be depre-
“ cated.

“ I would advise you, sir, by no means to
“ be disturbed by any criticism that may
“ emanate from an Edinburgh Reviewer. It

"is a critic's trade, to appear to know more "than the author he is dissecting; and to "praise without qualification would be to con-"fess that he had found a tutor, which must "never be allowed. They must be as infalli-"ble as the pope, or like him they would be "insignificant; yet let it be remembered, that "their tribe have maintained that Newton was "no philosopher, and that Pope was no poet."

I should here have concluded my extracts, which I might increase to a great extent, but having I submit most incontrovertibly established the unsoundness of your objection, and redeemed my pledge to prove it to be contrary to the laws of nature, the principles of science, and the results of experience, as well as to your own recorded opinions; and having also shown, as I engaged to do, that the very reverse of your proposition is true, and that fast-growing healthy trees are tougher, stronger, and of better quality than those of slower growth: having done this, I considered it unnecessary to add any thing further, in the shape either of fact, argument, or opinion. Neither did I think it requisite to give any extracts from the letters I received from two other gentlemen, whose opinions are to a certain extent opposed to my own; but just as I was about to close this letter, I received a communication which induced me to alter my determination as to the former, and will render the latter wholly unnecessary.

Since this work has been in the press, I received from Mr. Wm. Boorne, of Erpingham in this county, a most respectable timber-merchant, two specimens of oak, taken the one from a fast and the other from a slow growing tree. These are marked No. 1 and 2. The former was grown, Mr. Boorne informs me, upon a very *strong good soil.* Its age was he supposed about sixty years, and it contained from thirty-eight to forty cubic feet of timber. The other (No. 2) was about a hundred and twenty years old, and was grown upon a light soil with gravel about two feet below the surface. This tree contained about eighty cubic feet, but Mr. Boorne considers, that if No. 1 had stood to attain the same age as No. 2, it would have made at least forty feet *more than that tree.* These two specimens

I forwarded to Professor Barlow, of the Royal Academy, Woolwich, requesting that he would be kind enough to ascertain their comparative strengths, and whose report is as follows:

" *Royal Military Academy,*
" *September 1st*, 1829.

" I was not at home when your letter with " the two pieces of oak arrived, and I am sorry " that I have not had an earlier opportunity of " replying to your request. I have, however, " now the honor to inform you of the results. " The two pieces were squared down each to " two inches. They were broken on props " fifty inches asunder. Their specific gravi- " ty, elasticity, and ultimate and compara- " tive strength, were as below:

No. 1.

Specific gravity.	Deflected one fiftieth of its length with	Broken with	Comparative strength.
·903	660lbs.	999lbs.	1561
	No. 2.		
856	414lbs.	677lbs.	1058

"No 1 it appears is therefore about of medium strength, my mean number being for English oak 1470.

"No 2 is very weak, my weakest specimen being 1205 *(See Essay on Strength of Timber).*

"We tried, besides your two pieces, two very choice specimens of English oak, which had been very long in store, and the numbers were

Spec. grav.	Deflected one fiftieth with	Broken with	Comp. str.
·748	896lbs.	1447lbs.	2261
·756	680lbs.	1304lbs.	2037

"These again, compared with your weakest piece, shows that your No. 1 is about the common run of English oak."

Many persons are of opinion, not only that fast-growing timber is of better quality than that of slower growth, but that even the former possesses its *greatest strength* and durability when it is in the *full vigour* of its growth, and before it has attained maturity. This also appears to be the opinion of my correspondent, No. 14; and the fact may, to a certain extent, be inferred from the result of the above experiment. The specimen, No. 1, was, it appears, taken from a tree containing not more than forty feet of timber, and its age about sixty years. It is probable, therefore, that its superior strength to No. 2, is partly attributable, to its having been cut before its growth began to decline.

After I received the above report from Mr. Barlow, I was favoured with two other specimens of oak timber from my correspondent, Mr. Farrow (No. 8), whose account of them I will give in his own words: "These "specimens are from two trees off the *same* "*piece of land.* The tree from which No. 1 is "cut stood near *the rack-yard of the farm, by* "*the side of a ditch, into which ran a great deal* "*of moisture from the yard; and I have no* "*doubt, independent of the nourishment obtained* "*by it from the ditch so served, very many of* "*the smaller roots reached as far as the rack-yard,* "and the tree grew *rapidly*, and contained "when taken down one hundred and sixty "cubic feet of timber. The tree from which "No. 2 is cut grew, as I before stated, in the "same field, but had *none of the advantages* "before spoken of; but still the *soil was* "*good, with a lightish blue clay bottom.* This "tree grew well, but *not in any degree so fast as* "*the other,* and contained about ninety cubic "feet of timber; and it is the opinion of people who have known these trees many years, "that they were *both planted together.* On "weighing them I find No. 1 about one "pound and a quarter in ten pounds the heavier; and I doubt not, as they get dry, a "greater difference will be found."

These specimens were also forwarded to Mr. Barlow, an extract from whose report is as follows:

"*Royal Military Academy,*
"*September* 18, 1829.

"I got your specimens of wood on Sunday, "but was not able to make the experiments "until this morning. These were made pre-

" cisely as the last, and the results are as " below :

No. 1.

Specific gravity.	Weight that deflected the piece 1-50th of its length.	Broken with	Comparative strength.
972	606lbs.	999lbs.	1561

No. 2.

Specific gravity.	Weight that deflected the piece 1-50th of its length.	Broken with	Comparative strength.
835	439lbs.	943lbs.	1473

" The experiments were very satisfactory " as regards the fracture: I hope they may be " so as regards your theory. It is remark- " able, that the piece No. 1. broke with the " same weight as the former No. 1."

The difference in strength between these two specimens is but little, owing to the trees being both grown upon tolerably good land, except that No. 1 required more weight to deflect it; that difference, however, is in favour of the fast-growing and manured tree; and I think it probable, for the reasons before stated, that if No. 1 had been cut down fifty years ago, its strength would have been much greater.

These experiments throw new light upon the subject, and lead to the most important conclusions. They prove, not only that fast-growing oak timber is superior in quality to that of slower growth, but that, by the *constant* application of manure to the roots of trees planted even in a *good* soil, nearly double the quantity of timber may be obtained in the same period, while its strength, instead of being *diminished*, will be thereby increased.

How clearly do they establish the correctness of Mr. Knight's opinion, quoted at p. 48, that " the superior value of the English oak " depends on its vigorous and rapid growth!" How fully do they confirm the opinions of the several gentlemen whose communications I have before given! What a striking refutation do they give to your objection, that to manure poor land at *the time of planting only*, will deteriorate the quality of timber! All your scientific and refined reasoning against manure and cultivation on that score, all your illustrations about wild raspberry-canes and thorn-bushes, cultivated apple-trees, and spokes for wheels, are here completely overthrown; and your eulogists, the celebrated critics of modern Athens, exhibit to the world as splendid an example of rural wisdom, as of gentlemanly feeling and controversial urbanity.

But, as I have before shown, you have in your work set up two contradictory principles, and the public has a right to be informed by which you mean to abide. In the body of it you recommend trenching and manuring, as the best means of obtaining *sound* and valuable wood; and in your notes and illustrations you condemn this system, because it will produce timber of *inferior* quality. If the last quoted opinion be correct, what becomes of the theory in support of the culture-system, which occupies so large a portion of your work, and which you inform me has obtained the approbation of so many learned and scientific men both at home and abroad? If that theory be a sound one, as I contend it is, it rests with you to account for attempting to destroy it, and to reconcile contradictions so glaring, and which must be regarded by your readers as so highly complimentary to their understandings.

Let us now look at the facts stated by Mr. Farrow in regard to PROFIT. I have always contended that the expense of preparing the soil for trees bears no adequate proportion to the increased growth thereby occasioned, and that a very *trifling* annual increase upon each tree will amply compensate the planter for his additional outlay. I think I have proved this in my Memoir addressed to the Society of Arts, and it is confirmed by the facts stated in Mr. Boys' letter (p. 96). My idea has always been, and I have continually urged it in opposition to the advocates of the hole-digging system, that if it be conceded that the same return can be thereby ultimately obtained—viz. that what the culture-system will produce in sixty years may be obtained in seventy-four (but which I altogether deny)—the former crop will then, with the interest upon it, be at least double the value of the latter. But how short does even this fall of the conclusion to be drawn from the facts stated by Mr. Farrow! Here is an instance of two trees, growing in the same field, and in the same kind of soil, and planted at the same time. The one which had no support but the natural soil, produced ninety feet of timber in one hundred and twenty years; the other, whose roots were continually nourished by manure, made one hundred and sixty feet in the same period, being a difference of seventy feet. The manured tree made upon an average one foot and a third of timber in each year, which is a most astonishing growth. Estimated therefore according to that rate of increase, this tree was fifty years ago of equal size and of superior value to the unmanured tree at the time it was cut down. Now, if we reckon the value of the timber at only eight pounds a load, and allow compound interest for the fifty years, the difference in value between the manured and unmanured tree amounts to upwards of one hundred and sixty-five pounds.

This is the amount of profit arising from manure upon one tree. Let a calculation, founded upon some such data, be applied to the millions of acres which might be covered with forest-trees; and then let land-owners and let statesmen reflect, whether *our own country* does not afford ample and profitable employment for all the " surplus" agricultural labourers, who now exist in such wretchedness and misery: whether it be not at all events one of the means by which this misery may be alleviated, and the riches of the land-owner, and the strength and resources of the country at the same time greatly increased. Where can a land-owner so well invest his unemployed capital as in the permanent improvement of his own estate? How can he so judiciously dispose of it, as in giving employment, with *adequate wages,* to those who have a legal claim upon him for subsistence, who, for want of such employment, and for the purpose of obtaining sufficient food, are driven to the commission of crimes; but who, by better treatment, might be brought to abandon their unlawful pursuits, and become not only obedient and industrious, but the faithful protectors of the property of their employers? These opinions, I am aware, do not accord with the philosophy of the Scotch school; but I know them to be founded in truth, and have seen a practical illustration of them in my own neighbourhood. In this very town, Messrs. Hudson and R. H. Gurney have, for the last two or three years, given employment to between thirty and forty labourers during the winter-months, in trenching land for planting, who would otherwise have been a burthen to their parishes. These men earned from two shillings to two shillings and six pence per day, instead of receiving the parish-allowance of from four to seven or eight shillings a week, according as they might be single or married, and the number of their families. These gentlemen have thus conferred a threefold benefit: they have improved their estates, relieved parishes from a heavy burthen, and placed the labourers beyond the reach of temptation to commit depredation upon others; and what is of greater importance, though a necessary consequence, they have by these and other means acquired the good opinion of the labouring classes, who will on no account do injury to their property.

It is the fashion now-a-days to cry down the poor, and to represent them as idle, dishonest, and ungrateful. I deny the fact:

and, speaking from experience, I maintain that, if *well treated*, they are, as a body, honest, industrious, and grateful; and that if employment with good wages were afforded them, crimes of all descriptions would in the country speedily diminish. I hope to be pardoned for this digression, but it is a subject which warmly interests my feelings; and as one great motive for my endeavouring to show the advantages of trenching land for trees, is to point out the means of giving profitable employment to the poor, I trust it will not be considered intrusive or unbecoming in me, to press it so earnestly upon the consideration of the land-owners.

I must now return again to your book; and as you have in your notes to it deduced certain practical conclusions from your arguments against the culture-system, you must allow me to imitate your example, and to draw conclusions in favour of that system, from the facts and arguments which appear in the former part of the same work.

First. That trees require *depth* and *rich-*

ness of soil to raise them to PERFECTION.[1] That trenching is therefore a most important and *necessary* operation, and that, if animal or vegetable *manure* cannot be commanded, artificial modes of enriching or improving the soil *must* be resorted to.[2]

SECONDLY. That these are the true principles of GENERAL PLANTING, and must govern every attempt at successful arboriculture;[3] and that, by following them, we shall insure to our trees *uniform health* and *progressive* vigour, and by consequenee, SOUND and valuable wood.[4]

THIRDLY. That the slightest trial is sufficient to prove, that plantations may in this way certainly be more speedily and cheaply raised, than by any other; and that a greater return will be made to the planter in ten or twelve years, than in five and twenty or thirty by the common methods.[5]

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[1] Planter's Guide, p. 175.
[2] Planter's Guide, p. 177.
[3] Planter's Guide, p. 101.
[4] Planter's Guide, p. 100.

FOURTHLY. That trees of *large dimensions* are required for naval ship-building; and that the size of wood, being mainly in proportion to the depth and richness of the soil in which it grows,[6] a thin sterile soil is incapable of producing timber of sufficient magnitude for the purpose. To trench and enrich or improve such a soil, so as to make it approximate in quality to a soil naturally rich, must therefore increase its capacity for growing naval timber of proper size; and by promoting the *uniform* health and *progressive* vigour of the trees, by consequence, insure *sound* and valuable wood.

FIFTHLY. That to trench and manure poor land for forest-trees will, therefore, not only increase the planter's profit, but also increase the size and improve the quality of the timber.

These conclusions are fairly deduced from

[5] Planter's Guide, p. 466, 467.

[6] Planter's Guide, p. 167.

your own facts and arguments, and they are I think incontrovertible. Laying aside, however, the question as to the propriety of introducing this system of planting into the forests, which is unimportant to the general planter, we may congratulate each other as "fellow-labourers" on the advancement, which this discussion must give to the *science* and practice of planting. It can now no longer be contended, that to pulverize and enrich a poor soil will produce no beneficial effect upon the growth of the trees beyond a few years; it can no longer be maintained, that this increased growth will not answer the expense; nor can the difficulty of obtaining a cheap manure adapted for the purpose, except "in "comparatively few situations,[7]" be any longer urged. To these dangerous but hitherto prevalent errors, the finishing blow has now been given; and I willingly allow, that you have most ably and powerfully assisted in that great work. We may therefore reasonably look forward to the time, when (to quote partially your own words) "arboriculture, like

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[7] Planter's Guide, p. 464.

"husbandry, will be properly understood, "and a better return may be expected for the "vast sums laid out in planting—when trees "will be adapted to their appropriate soils, "and what is of little less importance to their "appropriate climates—when the efforts of "nature will every where be seconded, in"stead of being repressed or counteracted, "and an efficient management supersede a "fortuitous practice."[8]

If my humble but earnest endeavours have in any degree contributed to so desirable an object, if any exertion of mine shall tend to promote the benefit of the country, or to improve the condition of the industrious labourer, I shall be most amply repaid. It has required no great sacrifice at my hands. I have occasionally snatched a few hours from professional pursuits, to record facts and opinions which I thought might be useful to others; but whether acted upon by them or not must be wholly immaterial to myself. I was desirous of communicating to others the result of my own experience, for their sake rather than my own; for it is obvious, that, although my advice should be rejected, my own trees would not grow the slower, nor would the triumph and superiority of the system I recommend be finally rendered the less manifest or certain. It is, however, gratifying to me to know, that this system has been very extensively adopted in various parts of the kingdom; that it has lately received the sanction of the Court of Chancery upon an estate in this county; that it is daily gaining converts among my "rustic readers," as the Edinburgh Reviewers call the great land-owners of the kingdom; and I feel confident that it will finally become *general*, "except in wild and mountainous regions, or amongst rocks, inaccessible steeps, "or unstable surfaces."[9] With this I shall be perfectly content. The "gale of popularity" (unworthily obtained) has no attractions for me. I have nothing to expect or desire which the government has power to bestow. I live among friends and connections whom no consideration could induce me to quit, and my only ambition is to render some service to my native country, which I most anxiously wish to see prosperous, happy, great, and powerful.

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[8] Planter's Guide, p. 102.

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[9] Planter's Guide, p. 473.

I am, sir,

Your obedient and

Very humble servant,

W. WITHERS.

Holt, Norfolk, Sept. 30, 1829.

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